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Bibliography on Night Airglow, p. 213

8 February 1957 No. 2

METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

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METEOROLOGICAL ABSTRACTS AND BIBLIOGRAPHY

MALCOLM RIGBY, Editor

Vol. 8 FEBRUARY, 1957 No. 2

AGRICULTURE · COMMERCE · AERIAL
AND MARINE NAVIGATION · PUBLIC HEALTH · INDUSTRY · ENGINEERING
AMERICAN METEOROLOGICAL SOCIETY
1919

SPECIAL FEATURE IN THIS ISSUE

An Annotated Bibliography on Night Airglow

by
Mary L. Rice

(*For complete table of contents see back cover*)

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FOREWORD

Meteorological Abstracts and Bibliography is a monthly publication whose purpose is to bring to the attention of meteorologists current literature in their field and in related fields and to provide bibliographic information on various subjects, as interest demands.

Part I contains abstracts of current literature in the fields of meteorology, oceanography, etc., arranged according to the Universal Decimal Classification.

Part II of each issue comprises an annotated bibliography of important references on a special subject (usually arranged chronologically). No attempt is made to prepare exhaustive bibliographies; instead, the aim is to include a representative cross section of the various aspects of a subject.

Bibliographies published in the successive issues were:

Vol. I, 1950

1. Atmos. Pollution	2. Aerobiology	3. Cloud Physics	4. Hail
5. Tornadoes	6. Volcanic Dust	7. Climat. Changes	8. Thunderstorms
9. Icing	10. Acoust. Propagation	11. Evaporation	

Vol. II, 1951

1. Extended Forecast.	2. Long Range Forecast.	3. Soil Temp.	4. Constants, etc.
5. Clim. of Near East	6. Clim. of Middle East	7. Special Winds	8. Radar Storm Detect.
9. Condensation Trails	10. Clim. of N.E. Africa	11. Mountain Met.	

Vol. III, 1952

1. Clim. of N.W. Africa	2. Carbon Dioxide	3. Clim. of Argentina, etc.	4. Dew
5. Objective Forecast.	6. Stratus Forecast.	7. Urban Climatology	8. Clim. of C. Africa
9. Visibility	10. Glaze and Rime	11. Free Air Turbulence	

Vol. IV, 1953

1. Turbulence Theory	2. Turbulent Diffusion	3. Frost	4. Clim. of Australia, etc
5. High Level Winds	6. Winds in Stratosphere	7. Jet Stream	8. Radiation Bioclim.
9. Clim. of Pacific	10. Auroras	11. Sferics	

Vol. V, 1954

1. Oceanog. Met.	2. Clim. of S.E. Asia	3. Auroral Physics	4. Tropopause
5. Balloons	6. Numerical Forecast.	7. Radiation Data	8. Vertical Motion
9. Clim. of Arctic	10. Industrial Met.	11. Wind Waves and Swell	

Vol. VI, 1955

1. Bibliog. of Bibliog.	2. Texts & Monogr. Bibliogs.	3. Storm Surges
4. Ionospheric Prop.	5. Photochem.—Upper Atmos.	6. Cloud Physics
7. Radar Cloud Physics	8. Atmos. Nuclei (1841–1950)	9. Atmos. Nuclei (1951–1955)
10. Weather Modification	11. Cooling Power	

Vol. VII, 1956

1. Synoptic Met.-Arctic	2. Clim. of Enclosed Spaces	3. Cosmic Rays (–1952)
4. Cosmic Rays (1953–56)	5. Atmos. Radioactivity	6. Inversions
7. Snow Micromet.	8. Snow Micromet. (Suppl.)	9. Tropical Cyclones
10. Hurricane Damage	11. Tropical Cyclone Theory	

Bibliographies published this year are:

1. **Solar Relations with Weather,** Vol. 8, No. 1, Jan. 1957
2. **Night Airglow,** Vol. 8, No. 2, Feb. 1957

Forthcoming bibliography will be:

3. **Forecasting of Special Elements,** Vol. 8, No. 3, March 1957

Other bibliographies in preparation are:

Actinometers	*Ozone*
Forecasting of Special Elements	*Radio Astronomy*
Forest Micrometeorology	*Singularities*
Microwave Propagation	*Synoptic Aerology*

Part III contains a listing of reviews, translations, reprints, and the contents of important publications. These are published in the earliest issue where space permits.

Part IV is made up of author, subject and geographical indexes. The December issue comprises cumulative author, subject, geographical and journal indexes.

EXPLANATIONS

Location of material: For each entry, a symbol is given for at least one library where th material may be found. The Union List of Serials (Gregory) is the source of most of th symbols used. In some cases, where no symbol has been assigned to a library, one will b devised according to the principles of the Union List.

Library symbols used frequently may be found in the following list:

DA:	U. S. Dept. of Agriculture Library, Washington, D. C.
DBS:	U. S. Bureau of Standards Library, Washington, D. C.
DGS:	U. S. Geological Survey Library, Washington, D. C.
DLC:	Library of Congress, Washington, D. C.
DN-HO:	U. S. Navy Hydrographic Office Library, Suitland, Md.
DSG:	U. S. Army Medical Library, Washington, D. C.
DSI:	Smithsonian Institution Library, Washington, D. C.
DWB:	U. S. Weather Bureau Library, Washington, D. C.
GB-MO:	Great Britain, Meteorological Office Library, Harrow, England.
MH-BH:	Harvard University, Blue Hill Observatory Library, Milton, Mass.

Other symbols:

*	before an entry indicates a good data source.
†	before an entry indicates a good bibliography.
§	before an entry indicates a synoptic case history study accompanied by charts

Geographic locations are in the English form rather than the form used locally, for example Moscow for Moskva.

Titles of articles or monographs are in the language of the original article unless otherwis stated. Slavic (Cyrillic) titles are transliterated into the Roman alphabet according to th Library of Congress transliteration scheme.

Abbreviations:

Titles of periodicals are not abbreviated, as a rule.

The months of the year from March to July are not abbreviated. Other months ar abbreviated as Jan., Feb., Aug., Sept., Oct., Nov., and Dec.

The word or abbreviation for Volume (Tom, Band, Jahrgang, Año, etc.), for Numbe (Heft, Fascicule, Vypusk, etc.) and for page or pages is omitted from most entries. Thus a entry will read as follows:

Meteorologische Rundschau, 2(5/6):146–151, May/June 1950.

This indicates that the article appeared in *Meteorologische Rundschau, Jahrgang* 2 (Vo 2), *Heft* 5/6 (No. 5/6), *pages* 146–151, May/June 1950.

PART I. ABSTRACTS OF CURRENT METEOROLOGICAL MATERIAL

MAJOR GENERAL WORKS

COLLECTED WORKS

8.2–1 551.55:531(082) 551.5:92

†Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics: a collection of surveys of the present position of research in some branches of mechanics, written in commemoration of the 70th birthday of Geoffrey Ingram Taylor.** Cambridge (Eng.), Univ. Press, **1956.** 475 p. figs., tables, eqs. **DLC**—This handsome volume includes on p. 1–6 a biographical note with photo of SIR GEOFFREY TAYLOR (born March 7, 1886, in London). This is followed by 10 long papers on various branches of mechanics, of which those by LANE and GREEN, F. URSELL, M. J. LIGHTHILL, BATCHELOR and TOWNSEND, T. H. ELLISON, and K. S. M. DAVIDSON are abstracted separately. Each section is followed by an excellent bibliography. Review by P. A. Sheppard in *R.M.S., Q.J.*, 82(354):543–544, Oct. **1956.** (For contents, *see* p. 257 this issue, *MAB.*) *Subject Headings:* **1. Mechanics 2. Wind effects 3. Research surveys 4. Biography 5. Taylor, Sir Geoffrey.**—*C.E.P.B.*

BOOKS

8.2–2 551.582(266,52):629.12

Great Britain. Hydrographic Office. **Japan pilot, Vol. 2, Comprising Nansei Shotō, Kyūshū, Shikoku, the southern coast of Honshū, Nakai, and Nanpō Shotō.** 5 ed. London, **1953.** 49 + 809 p. 35 plates, tables.—Meteorology p. 23–43 including tables for selected stations. *Subject Headings:* **1. Marine climatology 2. Sailing directions 3. Japan.**—*C.E.P.B.*

MONOGRAPHS

8.2–3 551.481:551.**583.3**(798)

Drury, William H., Jr., **Bog flats and physiographic processes in the Upper Koskokwim River region, Alaska. With suggestions for the origin of certain mucks, an examination of the nature of local plant associations and a discussion of the implications as to periglacial climates.** *Harvard University. Gray Herbarium, Contributions*, No. 178, **1956.** 130 p. 24 figs., numerous refs. **DLC**—The area is in the region of discontinuous permafrost, 62–63½°N, 154–156°W. The lowlands have cold dry winters and warm wet summers. The older parts of the flood plain are mainly bog, which is spreading at the expense of the forest, but large areas of forest persist, and probably persisted through some of the Pleistocene ice advances. Glacial conditions in the Mississippi valley were similar, and it is argued that the important factor in glaciation was an increase in precipitation in middle and high latitudes. The ice itself caused cooling, but there is little evidence of an intensely cold climate far south of the ice. Northern species migrated far south, southern species only a little, resulting in much intermingling. *Subject Headings:* **1. Bogs 2. Quaternary climates 3. Alaska.**—*C.E.P.B.*

GENERAL GEOPHYSICS AND METEOROLOGY

EXPEDITIONS—ARCTIC, ANTARCTIC RESEARCH

See also: **International activity in Antarctica 1955–56** (Heap), 8.2–9; **South African expedition to Bouvet Island, 1955** (Hayward, Crawford), 8.2–11; **With the "Anton Dohrn" to Spitsbergen** (Mertins), 8.2–50; **The "Petula's" Met. logbook** (Dickson, Evans), 8.2–73; **General circulation, Antarctica** (Britton, Lamb), 8.2–122 and 8.2–123.

8.2–4 551.501.9:551.311.181(268)

Treshnikov, M. F., **The Soviet drifting station SP-3, 1954–55.** *Polar Record*, Cambridge, 8(54):222–229, Sept. **1956.** fig. **DLC**—Soviet arctic expeditions from 1937 onwards are described and drifts plotted. On April 9, 1954 SP (i.e., "North Pole") 3 landed on a floe in

85°N and drifted across the pole, ending north of Greenland on April 20, 1955. A full series of observations was organized, including radiosonde ascents twice daily. Tropopause varied from 4700 to nearly 12,000 m. Weather and adventures are briefly described. *Subject Headings:* **1. Ice drift stations 2. Arctic Ocean.**—*C.E.P.B.*

8.2–5 91.04:551.311.1(269,99)

Fuchs, V. E., **Trans-Antarctic expedition, 1955–56.** *Polar Record*, Cambridge, 8(54):264–267, Sept. **1956.** 2 photos. **DLC**—The "Theron" reached Halley Bay (75°36′S, 26°45′W) on Jan. 27, 1956, after being guided through the ice by an Auster plane. Ship and air surveys of sea and inland ice are described. The ship sailed for South Georgia on Feb. 8. *Subject Headings:* **1. Antarctic expeditions 2. Trans-Antarctic Expedition, 1955–56.**—*C.E.P.B.*

8.2–6 551.578.46(99)

Loewe, F., **Notes on firn temperatures and ablation in MacRobertson Land, Antarctica.** *Journal of Glaciology*, 2(20):725–726, Oct. **1956.** 2 tables, 6 refs. **DWB**—Firn temperatures at 5 m depth were observed S. of Mawson in 67.9–69.7°S (820–2080 m a.s.l.). Mean annual temperatures ranged from −21°C in 67.9 to −31°C in 69.7°S. Average of whole layer was about 1°C higher. Ablation May to mid-Nov. was 21 cm decreasing inland; it was very active in summer. *Subject Headings:* **1. Firn temperatures 2. Ablation 3. MacRobertson Land, Antarctica.**—*C.E.P.B.*

8.2–7 551.506.5(99)

Maling, D. H., **Recent Antarctic research.** *Nature*, London, 178(4537):773–775, Oct. 13, **1956. DWB**—Symposium at British Association, Sept. 4, 1956, opened by Sir R. Priestley on past expeditions. V. E. Fuchs outlined program in connection with the transcontinental journey and described the voyage of the "Theron." R. J. Adie spoke on geological research in Graham Land. D. H. Maling described meteorological and other observations of Falkland Islands Dependencies Survey and H. H. Lamb "Winds and weather" in Antarctic. *Subject Headings:* **1. Antarctic expeditions 2. Symposia.**—*C.E.P.B.*

8.2–8 91.04:656.7(99)

von Essen, Reinhold, **Air operations of the Norwegian-British-Swedish Antarctic expedition in 1952.** *Polar Record*, Cambridge, 8(54):230–236, Sept. **1956.** fig., 2 photos. **DLC**—Two Swedish aircraft carried out flights in Dronning Maud Land on 10 days Dec. 1951–Jan. 1952. Weather and icing are briefly described. *Subject Headings:* **1. Air surveying 2. Antarctic expeditions 3. Maudheim Expedition, 1949–52.**—*C.E.P.B.*

IGY

8.2–9 550.3:061.3(99)

Heap, John, **International activity in Antarctica 1955–56.** *Scottish Geographical Magazine*, 72(2):113–116, Sept. **1956.** fig., plate. **DLC**—Program of the Commonwealth Trans-Antarctic Expedition, and other expeditions planned, with map of stations. *Subject Headings:* **1. International Geophysical Year program 2. Antarctica.**—*C.E.P.B.*

8.2–10 550.3:061.3

Robin, Gordon, **Why an International Geophysical Year?** *Geographical Magazine*, London, 28(12):611–618, April **1956.** 7 figs. **DLC**—The development of polar geophysical research is summarized, including the 2 Polar Years. The great progress in instrumentation and organization since 1932 and still more since 1882 is emphasized. A map of the Antarctic shows stations proposed or already established. *Subject Headings:* **1. International Geophysical Year 2. International Polar Years.**—*C.E.P.B.*

8.2–11 91.04(97)

Hayward, L. Q. and Crawford, Allan B., **South African expedition to Bouvetøya, 1955.** *Polar Record*, Cambridge, 8(54):256–258, Sept. **1956.** fig., 2 photos. **DLC**—This article,

summarized from the *Cape Times*, describes an expedition to select a site for a meteorological station for the International Geophysical Year. After a survey the South African Government decided not to proceed with the project. *Subject Headings:* **1. Expeditions 2. Bouvet Island.**—*C.E.P.B.*

8.2–12 551.501.9:69(99)

Imbert, Bertrand, **Metal buildings at the French Antarctic base on Île des Pétrels.** *Polar Record*, Cambridge, 8(54):246–252, Sept. **1956.** 2 figs., photo, 4 refs. **DLC**—For the International Geophysical Year station off Adélie Land metal buildings were selected. Shell, foundations, thermal insulation, heating and ventilation are described. *Subject Headings:* **1. Building materials 2. Antarctica.**—*C.E.P.B.*

8.2–13 550.3:061.3 551.5:061.3

Kaplan, Joseph, **United States programme for the International Geophysical Year.** *Nature*, London, 178(4535):665–667, Sept. 29, **1956. DWB**—U. S. program includes regular soundings to 100,000 ft in Antarctic, Arctic, S. America and U.S.A., a "Weather Central" in Antarctica to prepare twice-daily synoptic charts, spectroscopic observations of sun and aurora, studies of cosmic rays and ionosphere, deep ocean currents, glaciology, etc. and launching of earth satellites. *Subject Heading:* **1. U. S. participation in International Geophysical Year.**—*C.E.P.B.*

8.2–14 551.5:91.04(99) 550.3:061.3(99)(04)

Priestley, Sir Raymond, **Twentieth-century man against Antarctica.** *Nature*, London, 178(4531):463–470, Sept. 1, **1956. DWB**—In this Presidential Address to the British Association, the history and results of Antarctic exploration are summarized, with a note on the present political situation. Vicissitudes of whaling are described. Antarctic plans for the International Geophysical Year are set out, especially in meteorology. Finally, the future of Antarctica is briefly discussed. *Subject Headings:* **1. Antarctic expeditions 2. International Geophysical Year Program 3. Addresses 4. Antarctica.**—*C.E.P.B.*

OBSERVATORIES

8.2–15 551.501.9(417)

McWilliams, S., **Valentia Observatory.** *Weather*, 11(9):276–280, Sept. **1956.** 3 figs., 4 refs. **DWB**—In 1806 the site was on Valentia Island, but in 1892 the observatory was moved to the shore of Valentia River (51°56′N, 10°15′W). Routine of full eye, autographic, upper air and magnetic observations is described. *Subject Headings:* **1. Meteorological observatories 2. Valentia, Eire.**—*C.E.P.B.*

8.2–16 621.396.8:522.1

Priester, W., **Die Radiosternwarte der Universität Bonn.** [The radio astronomical observatory of Bonn University.] *Umschau*, 56(20):609–610, Oct. 15, **1956.** 4 figs., 2 refs. **DLC**—Work is being done on a new radiotelescope on the northern Eiffel Mountains at a height of 435 m. The construction is illustrated. *Subject Headings:* **1. Radio observatories 2. Germany.**—*C.E.P.B.*

8.2–17 550.340.19:550.380.19(436)

Toperczer, M., **Das geophysikalische Observatorium Wien-Kobenzl.** [The Geophysical Observatory of Vienna (Kobenzl).] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):406–420, **1956.** 7 figs., 2 refs. German, English and French summaries p. 406. **DWB**—After many set-backs the building of a new Austrian geomagnetic and seismological observatory began in summer 1953 and was finally completed on Dec. 28, 1955. It lies on the S.E. slope of Latisberg, 3.6 km from the Vienna Hohe Warte, at a height of 400 m. Site, buildings and technical installations are fully described and illustrated. *Subject Headings:* **1. Magnetic observatories 2. Seismic stations 3. Vienna, Austria.**—*C.E.P.B.*

CONFERENCES AND SYMPOSIA

See also: **Recent Antarctic research** (Maling), 8.2–7; **Future of glaciology: a symposium,** 8.2–44; **Domestic heating conf.,** 8.2–51; **Smoke abatement conf.** (Sarjant), 8.2–53; **Sixth O.S.T I.V. Congress** (Wallington), 8.2–141; **Symposium on applied solar energy** (Meffert, Stratmann), 8.2–144; **Symposium on hydrology** (Glasspoole), 8.2–248.

8.2–18 551.5:621.396.663:061.3

Hinzpeter, Max, **Diskussionstagung "Meteorologie und Funkortung" in Essen.** [Discussion on "Meteorology and Radio direction-finding" in Essen.] *Meteorologische Rundschau,* 9(9/10):187–188, Sept./Oct. **1956. DWB**—Report of the meeting of 26–27 June 1956, in which foreign and German experts took part. *Subject Headings:* **1. Radio-direction Finding Conference 2. Essen, Germany.**—*C.E.P.B.*

8.2–19 629.19

Nonweiler, T., **Seventh International Astronautical Congress.** *Nature,* London, 178(4538):832–833, Oct. 20, **1956. DWB**—At the Rome Congress, Sept. 17–22, 1956, many papers dealt with the American artificial satellite (Project Vanguard). Risks from cosmic primary radiation and even time dilation were also discussed. No statement was made on Russian satellite project. *Subject Headings:* **1. Artificial satellites 2. Astronautics.**—*C.E.P.B.*

8.2–20 551.5:061.3 550.3:061.3

Schweitzer, H., **Meteorologen-Geophysiker-Tagung 1956.** [Meteorological and geophysical meeting 1956.] *Umschau,* 56(21):663–664, Nov. 1, **1956. DLC**—Account of joint meeting at Hamburg Sept. 25–29, 1956. Interest centered mainly on the International Geophysical Year program (discussion opened by J. BARTELS), but atmospheric circulation, improvement of balloon measurements, monthly forecasts, etc. were also considered. *Subject Headings:* **1. Meteorological conferences 2. Geophysical conferences.**—*C.E.P.B.*

SOCIETIES, INSTITUTIONS AND SERVICES

See: **Int. Soc. of Bioclim. and Biomet.** (Delany, Waterhouse), 8.2–279.

8.2–21 551.5:061.1(09)(41)

Brunt, Sir David, **The centenary of the Meteorological Office: retrospect and prospect.** *Science Progress,* London, 44(174):193–207, April **1956. DWB**—History of the British Meteorological Office since its foundation in 1855 under FITZROY, and the recommendations of successive Committees of Enquiry. The various stages of scientific work are discussed from "pre-SHAW days" to the present, and the survey ends with "a brief look backward and forward." *Subject Heading:* **1. History of British Meteorological Office.**—*C.E.P.B.*

8.2–22 551.5:061.1(667)

Eldridge, R. H., **The Gold Coast Meteorological Department: some impressions.** *Weather,* London, 11(9):291–295, Sept. **1956.** photo. **DWB**—The development and structure of the Gold Coast section of the British West African Meteorological Services is described. It includes 4 branches: Synoptic (Forecasting and Training), Climatological, Stores and Staff, and Agricultural meteorology. Problems of applied meteorology are listed. A photo of the station at Wa is included. *Subject Headings:* **1. Meteorological services 2. Gold Coast.** —*C.E.P.B.*

8.2–23 551.5(058)(41)

Great Britain. Meteorological Office, **Annual report of the Director . . . for the year April 1, 1954 to March 31, 1955.** London, **1955.** *M.O.* 594. 67 p. **DLC**—This report follows the usual lines (*see* 4.5–17, May 1953, *MAB*). *Subject Headings:* **1. Annual reports 2. British Isles.**

8.2–24 551.501.9:551.586

Häberlin, Carl, **Bioklimatische Forschungsanstalten.** [Bioclimatic research institutes.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte,* No. 42:349–352, **1952. DWB**—An historical summary, with names and dates but not references, of the development of bioclimatic research in Germany. *Subject Headings:* **1. Bioclimatological institutions 2. Germany.**—*C.E.P.B.*

8.2–25 551.5(512.317)

Heywood, G. S. P., **Meteorology in Hong Kong.** *Weather*, 10(12):413–416, Dec. **1955. DWB**—Description of climate and weather of Hong Kong, typhoon forecasting, etc. *Subject Headings:* **1. Meteorology of Hong Kong 2. Hong Kong.**—*C.E.P.B.*

EDUCATION, HISTORY AND BIOGRAPHY

EDUCATION

8.2–26 551.5:37

The teaching of meteorology [editorial]. *Weather*, 11(10):304–305, Oct. **1956.** Also: **Meteorology in secondary schools.** *Ibid.*, p. 305–318. And: Rigg, J. B., **Meteorology at Watford Grammar School for boys.** *Ibid.*, p. 323–325. 2 figs., 3 refs. And: Scorer, R. S., **The teaching of meteorology—an essay review of Sverre Petterssen: Weather analysis and forecasting. Vol. 1—Motion and motion systems. 1956.** *Ibid.*, p. 332–333. **DWB**—The Editorial pleads for teaching of meteorology in upper schools as a branch of physics rather than geography, and for meteorology as a branch of hydrodynamics in universities. The second paper, by some Inspectors of Schools, explains the importance of weather study, both theoretical and practical. Theory is considered under humidity and temperature, pressure and winds, and air masses and fronts. Under observation continuous recording, regular practical use, display and exchange of readings with other schools are recommended, also short term observations for specific purposes (9 examples given). Advice is given on instruction, instruments (including upper air) and non-instrumental observations. Rigg describes work and misadventures at a large school. Scorer strongly recommends Petterssen's book as a text for "mature" students. *Subject Heading:* **1. Teaching of meteorology.**—*C.E.P.B.*

8.2–27 551.5:061.4

Hanson, W. R., **Itinerant meteorological exhibition.** *Meteorological Magazine*, London, 85(1012):314–315, Oct. **1956.** 2 photos. **DWB**—An "Interant Meteorological Exhibition" for museums was opened at Leicester on Aug. 3. It shows instruments and equipment, diagrams, photos, forecasters' working charts and illustrations of the role of the Meteorological Office in the life of the community. It was attended by 16,091 visitors in 3 weeks. *Subject Heading:* **1. Meteorological exhibitions.**—*C.E.P.B.*

BIOGRAPHY

See also: **Benjamin Franklin: natural philosopher** (Schonland), **8.2–319.**

8.2–28 550.3:92(09)

Bullard, Sir Edward, **Edmond Halley: the first geophysicist.** *Nature*, London, 178(4539): 891–892, Oct. 27, **1956. DWB**—Between Halley's birth in 1656 and death in 1742 the basis of modern science was laid down, in celestial mechanics by Newton, but the scientific approach of Halley did much to solve the problems of geomagnetism, trade winds, etc. involving collection of a large amount of data. *Subject Headings:* **1. Biography 2. Halley, E.**—*C.E.P.B.*

8.2–29 551.5:92

Rathbone, Kenneth C., **Beaufort of the Beaufort Scale.** *Nautical Magazine*, 175(4):223–224, April **1956. DLC**—Brief biography. The wind scale was developed in 1805–1807. Rear-Admiral Beaufort died Dec. 17, 1857. *Subject Headings:* **1. Biography 2. Beaufort, Sir Francis.**—*C.E.P.B.*

8.2–30 551.5:92(09)

Rogers, Peter, **The weather theories and records of Colonel Capper.** *Weather*, 11(10):326–329, Oct. **1956.** ref. **DWB**—Col. J. Capper retired from East India Co. to near Cardiff, Wales. In 1810 he published **Meteorological and miscellaneous tracts,** discussing transport of electric charges by winds, influence of moon on weather through tides, revolving storms, etc. He kept regular observations from 1800–1807. *Subject Headings:* **1. History of meteorology 2. Biography 3. Capper, J.**—*C.E.P.B.*

8.2–31 551.583.3:92:012

Panzer, Wolfgang, **Fritz Klute (29.11.1885–7.2.1952).** *Petermanns Geographische Mitteilungen*, 97(3):169–173, **1953.** 62 refs. **DWB**—KLUTE was a geographer especially interested in Ice Age investigations. His earliest work was in the Black Forest. In 1912 he took part in an expedition to Kilimanjaro and mapped the mountain with present and former glaciations. He also explored in Norwegian Lapland, Argentine Cordilleras in 40–44°S (finding 3 glaciations) and in West Greenland. His later work dealt with climatology of the Ice Age. *Subject Headings:* **1. Biography 2. Klute, F.**—*C.E.P.B.*

8.2–32 551.5:92

Scherhag, R., **Dr. Bernhard Neis [obituary].** *Meteorologische Rundschau*, 9(9/10):153, Sept./Oct. **1956. DWB**—Died May 24, 1956, aged 74. Known for publications on dynamical meteorology, circulation, long range forecasting, etc. and **Fortschritte in der meteorologischen Forschungen seit 1900** (Frankfurt a.M. 1954). *Subject Headings:* **1. Obituaries 2. Neis, B.**—*C.E.P.B.*

8.2–33 551.5:92

Sutton, O. G., **Obituary [of] Dr. G. J. H. Swoboda.** *Nature*, London, 178(4535):671–672, Sept. 29, **1956.** For other obituaries see: Gregor, A., **Za Dr. Gustavem Swobodou.** [In memoriam, Dr. Gustav Swoboda.] *Meteorologické Zprávy*, Prague, 9(4):85, **1956.** port. **Obituary [of] Dr. G. Swoboda.** *World Meteorological Organization, WMO Bulletin*, 5(4):147, Oct. **1956. [Obituary of] Gustav Julius Swoboda.** *American Meteorological Society, Bulletin*, 37(9):479, Nov. **1956.** port. Weickmann, L., **Dr. Gustav Swoboda [obituary].** *Meteorologische Rundschau*, 9(11/12):193–194, Nov./Dec. **1956.** 13 refs. Mörikofer, W., **Gustav Swoboda [obituary].** *Archiv für Meteorologie, Geophysik und Bioklimatologie*, Ser. A, 9(4):524–526, **1957.** Also: **Retirement of Dr. G. Swoboda.** *World Meteorological Organization, WMO Bulletin*, 4(4):153–154, Oct. **1955.** photo. **DWB**—GUSTAVE SWOBODA, born at Prague, died at Geneva Sept. 4, 1956, aged 63. Joined Czech Meteorological Service in 1920 and was one of the earliest supporters of the Bjerknes school. A great linguist, in 1938 he succeeded Dr. CANNEGIETER as Chief of Secretariat of I.M.O. From 1951 to 1955 Secretary-General of W.M.O. At his death he was Professor of Meteorology at Istanbul. *Subject Headings:* **1. Obituaries 2. Swoboda, Gustave J. H.**—*C.E.P.B.*

HISTORY

See: **Centenary of Met. Office** (Brunt), 8.2–21; **Col. Capper's weather theories and records** (Rogers), 8.2–30; **British summers of the past** (Manley), 8.2–71.

APPLIED METEOROLOGY

OCEANOGRAPHY AND MARINE METEOROLOGY

See also: **Interaction of Arctic ice, atmos. and ocean** (Schell), 8.2–95; **Long waves and vorticity in atmos. and ocean** (Defant), 8.2–126; **Storm frequency in German waters** (Rodewald), 8.2–131; **Storm surges, N. Sea** (Darbyshire, J., Darbyshire, M.), 8.2–132; **Sea temp. profiles** (Houghton), 8.2–174; **Wave generation** (Darbyshire), 8.2–191; **Ice accumulation on trawlers** (Hay), 8.2–192; **Wind-sea surface drift relationships** (Hughes), 8.2–193; **Neumann's sea spectrum** (Roll, Fischer), 8.2–194; **Wave generation** (Ursell), 8.2–195; **Mechanics of sailing ships** (Davidson), 8.2–197.

8.2–34 551.46:532.59

Crease, J., **Long waves on a rotating earth in the presence of a semi-infinite barrier.** *Journal of Fluid Mechanics*, London, 1(1):86–96, May **1956.** 4 figs., 12 refs., 33 eqs. **DLC**—The effect of rotation on storm surges behind a barrier parallel to the wave crests is shown by mathematical analysis to be the formation of additional waves in the shadow region, with crests at right angles to the incident wave, travelling along the barrier. Their amplitude at the barrier may exceed that of the incident waves at large distances down the barrier, but decreases exponentially with distance from it. The results may have applications in meteorology. *Subject Headings:* **1. Ocean wave propagation 2. Waves at a barrier.**—*C.E.P.B.*

8.2–35 551.46

Wüst, Georg, **Der heutige Stand der Tiefseeforschung.** [The present position of deep-sea investigation.] *Umschau*, 56(22):673–675, Nov. 15, **1956.** fig., table, 14 refs. **DLC**—Various methods of deep sea exploration are referred to. Soundings of more than 10,000 m are listed; the deepest is 10,863 m in the Mariana Sink. Temperatures, salinities, pressures and biological results are briefly summarized. *Subject Heading:* **1. Oceanographic research.**—*C.E.P.B.*

8.2–36 532.59:551.46

Roll, H. U., **Von der Häufigkeit besonders hoher Wellen im Seegang.** [On the frequency of especially high sea waves.] *Wetterlotse*, Hamburg, No. 102/103:113–122, July **1956.** 2 figs., table. **DLC**—Examples of damage to ships by outsize waves are quoted. It is characteristic of irregular seas that the distribution of wave heights is random, and extra large waves occur from time to time. A wave record given by W. J. Pierson is reproduced and analyzed; of 276 waves, mean height 1.58 m, 13 exceeded 3 m but only one 3.8 m. Some laws of distribution are deduced, but changes of wind and wave energy and instability of high waves reduce the actual frequency of outsize waves below the theoretical. *Subject Headings:* **1. Ocean wave heights 2. Exceptional waves.**—*C.E.P.B.*

8.2–37 621.397:551.46/8

Thomsen, Werner, **Das Unterwasserfernsehen und seine technischen Anwendungen.** [Underwater television and its technical applications.] *Umschau*, 56(18):565–568, Sept. **15, 1956.** 9 figs., 4 refs. **DLC**—The "vidicon" is described and wave-length of its light sensitivity compared to that of the human eye. Vision is limited by scattering and extinction. Spectral transparency of Alpine lakes, sea water, Danube, Rhine and peat pools is plotted. As turbidity increases the transparency peak shifts from 0.5 to 0.7μ. *Subject Heading:* **1. Underwater television.**—*C.E.P.B.*

8.2–38 551.46(261) 551.526.6(261)

Bowden, K. F., **Physical oceanography of the Irish Sea.** (In: Smith, Wilfred, **A Scientific Survey of Merseyside.** Liverpool, pub. for the British Association by the University Press of Liverpool, **1953.** p. 69–80. 7 figs.) **DLC**—Includes descriptions and charts of tides and tidal currents, surface temperature distribution (Feb., Aug.) and salinity. Average annual rainfall is estimated as 31.4 in. and evaporation (by energy balance) 22.6 in. *Subject Headings:* **1. Sea surfaces 2. Sea temperature 3. Irish Sea.**—*C.E.P.B.*

8.2–39 551.461.2:551.79

Shepard, F. P. and Suess, H. E., **Rate of postglacial rise of sea level.** *Science*, Wash., D. C., 123(3207):1082–1083, June 15, **1956.** fig., 9 refs. **DLC**—Studies of peat and shell material and radiocarbon dating on coasts of Holland, Texas and Louisiana indicate a steady rise of sea level by about 30 m in past 10,000 yrs. A possible halt about 7000–8000 B.P. may represent the Cochrane halt in the retreat of the ice. *Subject Headings:* **1. Sea level variations 2. Postglacial period.**—*C.E.P.B.*

8.2–40 551.464(261.2)

Kalle, Kurt, **Chemisch-hydrographische Untersuchungen in der inneren Deutschen Bucht.** [Chemical-hydrographical investigations in the inner German Bight.] *Deutsche Hydrographische Zeitschrift*, 9(2):55–65, **1956.** 26 figs., 2 tables, 6 refs. German, English and French summaries p. 55–56. **DWB**—Analyses of water from 0 and 10 m depth were made by the Institut für Meereskunde, Kiel, in Aug. 1954, at 65 points between the German coast and 54°50′N, 7½°E. Salinity, surface currents, fluorescence and amounts of various substances including albumen are set out in colored charts on folding plates and discussed. The tongue of Elbe water was clearly shown advancing to the NW. *Subject Headings:* **1. Sea water composition 2. German Bight.**—*C.E.P.B.*

8.2–41 546.79:551.464/5

Koczy, F. F., **Vertical eddy diffusion in deep water.** *Nature*, London, 178(4533):585–586, Sept. 15, **1956.** fig., 5 refs., eqs. **DWB**—Ionium is 98% precipitated from sea water and

radium is renewed from the sea floor and moved upwards by eddy diffusion. It is lowest at the surface and increases downwards in unstable layers. Eddy diffusivity near the bottom is calculated as 4–30 cgs units and amount of radium given off by the sea floor as $120\text{-}180\times10^{-12}$ gm/m²/yr. *Subject Headings:* **1. Radioactivity of sea water 2. Oceanic vertical diffusion.**—*C.E.P.B.*

8.2–42 551.465(265)

Barlow, E. W., **Currents of the western South Pacific Ocean.** *Marine Observer*, 26(174): 224–226, Oct. **1956.** 10 figs. **DLC**—Current roses are given and discussed for Dec.–Feb. and June–Aug. for several separate regions east and south of Australia and around New Guinea. Influence of monsoons is shown. *Subject Headings:* **1. Ocean currents 2. Western Pacific.**—*C.E.P.B.*

8.2–43 532.59

Wooding, R. A., **Approximate joint probability distribution for wave amplitude and frequency in random noise.** *Nature*, London, 176(4481):564–565, Sept. 17, **1955.** 6 refs., 6 eqs. **DWB**—A formula is derived for estimating the amplitude and frequency of the wave envelope from mean frequency of groups of high waves instead of from all waves. *Subject Heading:* **1. Wave spectra.**—*C.E.P.B.*

AERONAUTICAL METEOROLOGY

See: **Turbulence caused by large aircraft,** 8.2–185; **Simulation of cloud conditions for icing research** (Bigg), 8.2–214; **Aircraft condensation aura** (Sarson), 8.2–217; **Icing of aircraft** (Best), 8.2–219; **Distrails** (Tribble), 8.2–222; **Lightning strikes three aircraft** (Alexander), 8.2–316.

GLACIOLOGY

See also: **Ice movement and temp. in glaciers** (Loewe), 8.2–172; **Activity of Coleman Glacier** (Bengston), 8.2–266; **Ice recession, Dronning Louise Land** (Wyllie), 8.2–267, **Motion of glacial inland ice, N. Europe** (Kummerow), 8.2–268; **Wurm glaciation, Alps** (Knauer), 8.2–269; **Disappearance of last ice sheet, central Norway** (Strøm), 8.2–270.

8.2–44 551.311.1(08)

The future lines of progress in glaciology: a symposium held at Bedford College, London, 8 December 1955. *Journal of Glaciology*, London, 2(20):694–703, Oct. **1956. DWB**—G. Robin opened the discussion by outlining the problems and suggested that observation is outrunning synthesis. W. V. Lewis referred to problems raised by investigations of glacier flow in Norway. G. Manley discussed geography, history and budget, geophysics and physics of glaciers, especially movement of glacier ice. S. E. Hollingworth spoke on deformation of glaciers by movement and proposed detailed studies of internal structure, W. H. Ward and J. F. Nye on movement of glaciers. R. Haefeli and A. Bauer proposed an international organization. H. H. Lamb needed investigations of response of glaciers to either precipitation or temperature and asked for frozen-in evidence of former winds. J. M. Hartog required investigation of net heat balance of large ice masses, theoretical treatment of ice caps, long-term movement of glaciers and drilling to determine sub-glacial temperatures, ice thickness and internal velocity. *Subject Headings:* **1. Glaciology 2. Symposia.**—*C.E.P.B.*

AGRICULTURAL METEOROLOGY

See also: **Greenhouse radiation** (Seemann), 8.2–143; **Effect of rainstorms on cotton jassid** (Goodman, Toms), 8.2–235; **Grassland of Devon** (Moore), 8.2–259.

8.2–45 551.577.3:635.21

McDermott, N. and Ivins, J. D., **Rainfall as a factor influencing the yields of potato crops.** *N.A.A.S. Quarterly Review*, London, No. 27:106–108, Spring **1955.** fig., table. **DLC**—A close relation is found between rainfall May–Sept. and yield of potatoes at Sutton Bonington. *Subject Heading:* **1. Potato yield.**—*C.E.P.B.*

8.2–46 551.573:633.16:631.53

Wellington, P. S., **Effect of desiccation on the dormancy of barley.** *Nature*, London, 178(4533):601, Sept. 15, **1956.** 2 tables, 4 refs. **DWB**—Tables of germination of barley show an increase with decreasing moisture content. A varying proportion of grains fail to reach maturity because of insufficient desiccation before harvest, but this can be remedied by artificial drying in storage. *Subject Headings:* **1. Desiccation 2. Barley dormancy.**—*C.E.P.B.*

8.2–47 551.524:581.14:634.71

Williams, I. H. and Hudson, J. P., **Effect of environment upon the growth and development of raspberry canes.** *Nature*, London, 177(4513):798–799, April 28, **1956.** 2 figs., ref. **DWB**—*Rubus idaeus* plants were exposed to fluorescent lighting for 9 or 14 hrs daily at temperatures of 35–70°F. Effects on various stages of growth are described. *Subject Headings:* **1. Plant growth 2. Temperature effects 3. Raspberries.**—*C.E.P.B.*

8.2–48 551.577(945)

Wilson, R. Kent, **Die Landwirtschaftsgebiete des Staates Victoria in Australien.** [The agricultural regions of the State of Victoria.] *Die Erde*, 3/4:261–272, **1955.** 2 figs. **DLC**—Includes a map of annual rainfall and a description of natural regions. *Subject Headings:* **1. Rainfall of Victoria, Australia 2. Victoria, Australia.**—*C.E.P.B.*

FOREST METEOROLOGY

See also: **Afforestation of catchment areas** (Bleasdale), 8.2–288; **Afforestation of catchment areas** (Law), 8.2–289.

8.2–49 551.5:634.92

Schütt, P., **Forstschutz durch Züchtung.** [Forest protection by breeding.] *Umschau*, 56(20):617–620, Oct. 15, **1956.** 6 figs., 2 refs. **DLC**—An account is given of breeding of trees resistant to damage by insects, fungi and weather. Damage by late spring frosts is avoided by retarding development. Trees resistant to wind damage on coastal sites, or to damage by pollution near towns, can be similarly developed. *Subject Heading:* **1. Forest protection.**—*C.E.P.B.*

INDUSTRIAL AND MEDICAL METEOROLOGY

See also: **Science and the coal industry,** 8.2–85; **Emission of firedamp** (Carter, Durst), 8.2–99; **1952 fog, London** (Smithard), 8.2–108; **Symposium on applied solar energy** (Meffert, Stratmann), 8.2–144; **Solar energy utilization** (Thombe), 8.2–145; **Storm frequency at Iceland and Norwegian fisheries, 1955** (Mertins), 8.2–189; **Windmills** (Abraham), 8.2–196; **Dew point and cargo ventilation** (Matheson), 8.2–205; **Soil moisture deficits under long and short grass** (Goode), 8.2–210; **Water loss from various cropped surfaces** (Rider), 8.2–212; **Local climate as it affects design and siting of buildings** (Manley), 8.2–273; **Potato storage** (Wilson), 8.2–276; **Physiology in Polar regions** (Edholm), 8.2–282; **Weather sensibility** (Neuwirth), 8.2–283; **Heat regulation of MaSarwa** (Wyndham, Morrison), 8.2–284; **Bioclimatic investigations** (Hentschel), 8.2–285.

8.2–50 551.5:91.04:639.223(268)

Mertins, H. O., **Mit "Anton Dohrn" nach Spitzbergen. Meteorologische Dienste und Erfahrungen auf einer Fischereiforschungsfahrt (19.7.–15.8.1956).** [With the "Anton Dohrn" to Spitsbergen: meteorological service and experiences on a fishery investigation voyage, July 19–Aug. 15, 1956.] *Wetterlotse*, No. 106:183–192, Sept. **1956.** 2 figs. **DLC**—In connection with the cod fishery a voyage was made to Bear Island and the west coast of Spitsbergen. Observations were received from the fishing fleets and charted; weather reports and forecasts were broadcast. Typical summer weather (mainly E winds) is graphically described. The lee of Spitsbergen is very favorable, with shelter from the winds and deflection and diminution of the swell from the east. A list of ships in which meteorological observations were taken is given. *Subject Headings:* **1. Meteorological expeditions 2. Cod fishing 3. Arctic Ocean.** —*C.E.P.B.*

8.2–51 697:628.53:061.3

The domestic heating conference: clean air a main theme. *Smokeless Air*, London, No. 98:231–234, 236, Summer **1956. DWB**—Account of the Conference of the Institute of Fuel at Westminster May 1–2, 1956. A list of papers, with notes, is included under: 1. Fuels, 2. Heating methods and appliances, 3. Design of dwellings, 4. The planning and administration of smoke control areas. *Subject Headings:* **1. Heating 2. Smoke abatement 3. Conferences.** —*C.E.P.B.*

8.2–52 628.531:614.7

Saward, A. C. (*Chief Sanitary Inspector, Kingston-upon-Hull*), **Clean air: the duties of sanitary inspectors and local authorities. Excerpts from a paper to the Royal Society of Health at its Blackpool Congress, April 1956.** *Smokeless Air*, London, No. 98:262–263, 266, Summer **1956.** ref. **DWB**—Duties include noting smoke nuisances and surveying general state of the atmosphere. Although they spend only a small fraction of their time on smoke control, the system of local inspectors is the most efficient and economic method of control. *Subject Headings:* **1. Smoke abatement 2. Sanitary inspection.**—*C.E.P.B.*

8.2–53 628.53

Mason, J. B. M., **Plant engineers discuss air pollution: excerpts from a paper read to a meeting of the London Section of Incorporated Plant Engineers at the Royal Society of Arts on 4th October.** *Smokeless Air*, London, 96:103–105, Winter **1955. DWB**—Domestic heating tendencies are reducing pollution. Extended use of gas and smokeless fuels is recommended; oil is bad unless properly used. Peak loads in industry should be smoothed out. *Subject Heading:* **1. Smoke abatement.**—*C.E.P.B.*

8.2–54 628.53:061.3

Sarjant, R. J., **Smoke abatement in Britain: conference in Bournemouth.** *Nature*, London, 176(4488):863–864, Nov. 5, **1955. DWB**—Summary of proceedings, Sept. 28–30, 1955, dealing mainly with domestic heating and the Clean Air Bill. *Subject Headings:* **1. Smoke abatement 2. Conferences.**—*C.E.P.B.*

8.2–55 628.53:34

The Clean Air Bill: excerpts from the second reading. *Smokeless Air*, 96:109–123, Winter **1955.** 5 photos. **DWB**—W. F. Deedes introduced the Bill, which "represents a big step forward to combating the scourge of air pollution." A number of Members spoke, mostly in criticism, especially on the subjects of cement dust and sulfur gases. Duncan Sandys, Minister of Housing and Local Government, defended the Bill and promised some amendments. *Subject Headings:* **1. Smoke abatement 2. Laws.**—*C.E.P.B.*

8.2–56 628.531:343.347

The Clean Air Bill: a descriptive synopsis. *Smokeless Air*, London, No. 98:242–251, Summer **1956.** Also: **Third reading: the Commons sums up on the Clean Air Bill.** *Ibid.*, p. 252–256. **Editorial comment,** p. 219–224. **DWB**—The first article describes the Bill, at an intermediate stage, for the control of dark smoke, smoke from furnaces, smoke control areas and special cases, and for the establishment of Clean Air Councils in England and Scotland. The second article reports the debate on the Third Reading in the House of Commons. The Editorial discusses the importance and the weaknesses of the Bill. *Subject Headings:* **1. Smoke abatement 2. Laws.**—*C.E.P.B.*

8.2–57 551.571.3:616.12

Spence, E. J., **Weather and health.** *Weather*, 11(10):335, Oct. **1956. DWB**—Influence of humidity on coronary thrombosis. Activity should be restricted when r.h. exceeds 80%. *Subject Headings:* **1. Humidity effects 2. Heart disease.**—*C.E.P.B.*

8.2–58 551.586:612.8

Straube, G., **Die vegetativ nervöse Reaktion bei internen Erkrankungen unter Wettereinfluss.** [Influence of weather upon the reaction of the vegetative nervous system in internal

diseases.] *Annalen der Meteorologie, Medizin-Meteorologische Hefte*, Hamburg, No. 11:80–82, **1956.** 4 figs. **DWB**—Tests of the Vagus and Sympathicus nervous systems in a number of healthy and sick (migraine and bronchitis) persons show a much greater correlation of the vegetative nervous system with weather in the latter. The effect was least clear with cold fronts. *Subject Headings:* **1. Medical meteorology 2. Nervous system.**—*C.E.P.B.*

METEOROLOGICAL OBSERVATIONS AND INSTRUMENTS

METHODS OF OBSERVATION

See also: **Soviet drifting station SP-3** (Treshnikov), 8.2–4; **Buildings at French Antarctic base** (Imbert), 8.2–12; **Valentia Observatory** (McWilliams), 8.2–15; **Bioclimatic research institutes** (Häberlin), 8.2–24; **Upper air data** (Goldie), 8.2–110; **Beaufort estimates of wind forces at German lightships** (Richter), 8.2–177; **Ionospheric wind determination** (Pütter, Court), 8.2–201; **Radar obs. of showers** (Feteris, Mason), 8.2–224; **Recent developments in hydraulics,** 8.2–249; **Statistical applications to radiation effects on water** (van der Bijl), 8.2–290.

8.2–59 551.501:551.579.5

Kohn, Manfred, **Versuche über neue Anwendungsmöglichkeiten des Gipsblockes.** [Experiments on new applications of gypsum blocks.] *Meteorologische Rundschau*, 9(9/10):173–179, Sept./Oct. **1956.** 7 figs., 4 tables, 3 refs. **DWB**—Author reports experiments with the electrical gypsum soil moisture meter, which is briefly described. The variations of resistance of a block hung in the screen accurately followed a hair hygrometer. A block isolated from the soil, and 2 unprotected blocks 2 cm deep in soil, all showed a large daily variation, but the protected block soon became unusable. A very thin block for measuring air humidity gave reproducible results but had a temperature coefficient which may vary with humidity. Further experiments are necessary. *Subject Headings:* **1. Soil moisture measurement 2. Gypsum hygrometer.**—*C.E.P.B.*

8.2–60 551.501.4:551.521

Fett, W., **Strahlungs-Nomogramm für die freie Atmosphäre.** [Radiation nomogram for the free atmosphere.] *Zeitschrift für Meteorologie*, Berlin, 10(6):173–184, June **1956.** 7 figs., fold. plate, 8 refs., 32 eqs. **DLC**—Construction of a nomogram is described, and a large folding plate given covering 40–60°N, 0–30 km ht, 1000–15 mb, solar declination LMT and Central European Time, giving direction and intensity (in % of solar constant) of solar radiation. It is for use with radiosonde ascents, especially near sunrise. Calculation includes refraction and turbidity effects. Accuracy is shown by supplementary nomograms. An example of use is given. *Subject Headings:* **1. Radiation calculations 2. Radiation nomograms.**—*C.E.P.B.*

8.2–61 551.501.4:551.557

Fett, W., **Ein neues Höhenwind-Auswertgerät.** [An upper wind evaluation apparatus.] *Zeitschrift für Meteorologie*, 10(7):207–216, July **1956.** 4 figs., 5 refs., 24 eqs. **DLC**—A simple universal development of P. A. MOLCHANOV's apparatus for determining the wind vectors from theodolite or radar observations of pilot balloons is described and illustrated. It is capable of high accuracy. It consists of circular scales of diameter about 44 cm for basic projection, units, etc., with a correction for curvature of the earth, graduated to a height of 20 km. Full working instructions are included. *Subject Heading:* **1. Upper air wind computation.**—*C.E.P.B.*

8.2–62 551.501.4:551.576.2:551.521.11

Tribble, D. T., **Relation between 0900 G.M.T. cloud amount and sunshine total.** *Meteorological Magazine*, London, 85(1011):278–279, Sept. **1956.** 2 tables. **DWB**—Correlation between annual 9 h cloud amount C and daily sunshine percent S at 4 stations in England varies from -0.57 to -0.80. For monthly means at Wisley correlation is -0.37 to -0.92. Coefficients in regression equations are grouped around $S=100-9C$. *Subject Headings:* **1. Cloudiness 2. Sunshine calculation 3. England.**—*C.E.P.B.*

8.2–63 551.501.7:551.557

Matthews, L. S., **A direct-reading geostrophic wind scale.** *Meteorological Magazine*, London, 85(1011):263–267, Sept. **1956.** 2 figs., 8 refs., 15 eqs. **DWB**—Theory and directions are given for constructing a scale incorporating corrections for variation of Coriolis acceleration and of chart scale with latitude. It can be used in very high or low latitudes. High level winds were found to agree closely with geostrophic winds even in low latitudes. *Subject Heading:* **1. Geostrophic wind scales.**—*C.E.P.B.*

8.2–64 551.501.7:551.507.362:551.557

Reisig, Gerhard H. R., **Instantaneous and continuous wind measurements up to the higher stratosphere.** *Journal of Meteorology*, 13(5):448–455, Oct. **1956.** 14 figs., table, 5 refs., 12 eqs. **DWB**—The method, used with a guided missile, involves measuring velocity relative to the ground by tracking, pitch and yaw measured from the ground, angle of attitude of missile axis given by gyros and telemetered to the ground, and an accurate determination of "angle of attack" by an airflow meter at the nose. The theory is set out; it assumes horizontal air flow. Calculations for 3 ascents at Cape Canaveral, Fla. up to 60 km are shown as continuous graphs of wind speed and direction and vertical wind gradient *vs* altitude; they give generally good agreement with radiosonde ascents up to the height reached by the latter. Maxima and minima of velocity, which alternate frequently, are shown schematically. *Subject Headings:* **1. Upper air wind measurement 2. Rocket observation techniques.**—*C.E.P.B.*

8.2–65 551.501.81:551.509.31:551.515:551.576.11:551.577

Ludlam, F. H. and Mason, B. J., **Radar and synoptic studies of precipitating clouds.** London, Imperial College of Science and Technology, Dept. of Meteorology, Cloud Physics Research Laboratory. Contract AF 61(514)-809, Jan. **1956.** 44 p. 10 figs., 4 tables, 17 refs. Mimeo. **GB-MO**—The first part describes studies of precipitation by coalescence, also reported by P. J. Feteris and B. J. Mason in *R. Meteor. Soc., Quart. Journ.*, 82(354):446–451, Oct. **1956** (*see* 8.2–224). Radar studies of structure and development of thunderstorms are next described; in all cases the cloud base was above 0°C but the first lightning flash was 8–10 min later and the temperature at the ascending echo below −20°C. Vertical sections of the radar echo from a storm producing lightning were very patchy, while those from a large CuNb with no lightning were solid. Radar observations in rainbelts associated with a frontal system are shown, with an analytical cross section covering 900 km. Radar "upper bands" heralding frontal precipitation are discussed. A new (Mason-Ramanadhan) raindrop spectrograph using UV light is described. The last part discusses the parcel and slice theories of convection as a basis for forecasting the depth of thunderstorm cloud, and concludes that a modified parcel theory can be used to predict the heights of cloud tops; investigations are continuing. *Subject Headings:* **1. Radar analysis of clouds 2. Cumulonimbus development 3. Thunderstorm structure 4. Thunderstorm forecasting.**—*C.E.P.B.*

8.2–66 551.501.81:551.577

Schulze, Werner, **Wetterbeobachtungen mit dem 10 cm-Radar GL III.** [Weather observations with the 10 cm radar GL III.] *Annalen der Meteorologie*, 7(5/6):250–266, **1955/56.** 11 figs., 28 refs. German and English summaries p. 250. **DWB, DLC**—At the Aerological Station at Schleswig the GL III used for upper wind measurement can also detect showers and thunderstorms at distances up to 90 km and measure their motion and vertical structure; examples are given. The mechanism of rainfall is briefly discussed. Drizzle forms below the freezing level, but deeper clouds vary. In 22 out of 34 clouds the ice-melting layer was recognizable at a height of 4–8 km. The tops of the remaining 12 did not exceed 4 km, the 0°C level was below 2 km and the maximum reflection layer still lower. In these, coagulation played the dominant role. *Subject Heading:* **1. Radar precipitation echoes.**—*C.E.P.B.*

8.2–67 551.501.83:551.515.43

Clarke, C. and Byrne, B. J., **The location of thunderstorms by a single-station high-frequency ranging technique.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):210–228, Oct. **1956.** 10 figs., 6 refs. **DWB**—An improved set-up at the Radio Research Station,

Slough, is shown; the standard components including cathode ray tubes with persistent screens. A brilliance modulator is triggered by atmospherics reaching a predetermined field strength; otherwise no trace appears. Knowing the layer controlling propagation of sferics, the range is determined from calculated critical frequencies and MUFs, but this cannot be done when propagation is controlled by sporadic E. Examples are plotted for thunderstorms over Europe on Sept. 8 and July 30, 1954, compared with locations by British direction finders; the accuracy is comparable. The ranging technique can locate thunderstorms distant 500–2000 km, but except in winter the measurements must be combined with back-scatter measurements. *Subject Heading:* **1. Sferics thunderstorm location.**—*C.E.P.B.*

8.2–68 551.501.9:551.577.1

Watkins, L. H., **Variation between measurements of rainfall made with a grid of gauges.** *Meteorological Magazine*, London, 85(1006):120–121, April **1956. DWB**—Referring to his article in *Meteorological Magazine*, 84(1001):350–354, Nov. 1955 (*see* 7.4–87, April 1956, *MAB*), states that the funnels of the rain gages used were all but one within the specified sizes, and not too large as stated. The error was due to the use of a planimeter to measure areas directly. *Subject Heading:* **1. Rainfall measurement accuracy.**—*C.E.P.B.*

OBSERVATIONAL DATA

See also: **Antarctic research** (Maling), 8.2–7; **Measurement of natural freezing nuclei** (Murgatroyd, Garrod), 8.2–216.

8.2–69 518.4:551.506

Fletcher, L., **Personal bias introduced during interpolation.** *Meteorological Magazine*, London, 85(1010):249–251, Aug. **1956.** fig., 3 refs. **DWB**—Four assistants interpolating 980 values of vapor pressure from world mercator maps showed a bias in favor of .0, .5 and in one case .8. *Subject Heading:* **1. Interpolation errors.**—*C.E.P.B.*

8.2–70 551.506:519.241.1

Jenkinson, A. F., **Mean range in an autoregressive series.** *Meteorological Magazine*, London, 85(1010):232–233, Aug. **1956.** table, 2 refs., 3 eqs. **DWB**—The mean range in samples of 30 from a normal autoregressive series of unit standard deviation varies from 3.2 with $r=0.9$, 3.5 with $r=0.8$ to 4.1 with $r=0.0$. For a meteorological element r is generally about 0.8, so standard deviation of daily values can be found by dividing mean range by 3.5. *Subject Headings:* **1. Autoregressive series 2. Standard deviation computation.**—*C.E.P.B.*

8.2–71 551.506:902(410)

Manley, Gordon, **British summers of the past.** *Weather*, 11(10):335, Oct. **1956. DWB**—Notes on hot July 1783, cold June 1791, etc. *Subject Headings:* **1. Historic weather records 2. British Isles.**—*C.E.P.B.*

8.2–72 551.506.1:63(42)

Trowell, G. F., **Weather conditions during 1955.** *East Malling, England. Research Station, Annual Report* **1955**:73–75, pub. **1956.** fig., table. **GB-MO**—Summary of weather at East Malling Research Station with graphs of daily values and blossom periods. Monthly tabulations are given for East Malling and Trowley. *Subject Headings:* **1. Annual summaries 2. Agrometeorological stations 3. East Malling, Eng.**—*C.E.P.B.*

8.2–73 551.506.5(261)

Dickson, C. N. and Evans, F., **The Petula's meteorological logbook.** *Marine Observer*, 26(174):214–218, Oct. **1956.** chart, 3 photos, 3 tables, 5 refs. **DLC**—Summary of meteorological observations during a yacht voyage from Dakar to Barbados, Dec. 1, 1953 to Feb. 2, 1954. Winds and currents are tabulated and weather briefly described. *Subject Headings:* **1. Expeditions 2. "Petula" expedition, 1953–54 3. North Atlantic.**—*C.E.P.B.*

INSTRUMENT CARRIERS

See also: **Wind measurements** (Reisig), 8.2 64; **Rocket obs. of X-ray and ultraviolet spectrum** (Friedman), 8.2–154; **Rocket obs. of ultraviolet spectrum** (Tousey), 8.2–156; **Rocket obs. of ultraviolet spectrum** (V—, H. H.), 8.2–157; **Green flash from airplane** (Majendie), 8.2–301.

8.2–74 551.507.352:061.6 551.508:551.507.352

†Murgatroyd, R. J., **Meteorological research in aircraft.** *Great Britain. Meteorological Research Committee, M.R.P.*, 995, July 31, **1956.** 16 p. 29 figs., 40 refs. Mimeo. **DWB**—In this account the Senior Meteorological Officer of the British Meteorological Research Flight describes the work of the Flight since 1939. Sections deal with measurements by a Canberra up to 50,000 ft, of temperature, humidity, ozone, winds and turbulence. At lower altitudes (up to 25,000 ft) a large Hastings aircraft is used as a flying laboratory for studies of the physics of cloud, rain and condensation nuclei, in conjunction with a ground radar station. Other studies are in diffusion, cloud modification by seeding, radiation, etc. Plates show instrumentation and many typical results, including results of seeding experiments. A valuable bibliography is included. *Subject Headings:* **1. Airplane instrumentation 2. Airplane meteorological research 3. Meteorological Research Flight 4. Great Britain.**—*C.E.P.B.*

INSTRUMENTS

See also: **Met. research in aircraft** (Murgatroid), 8.2–74; **Fog precip. measurement** (Nagel), 8.2–237; **Ion variation measurement** (Dessauer et al.), 8.2–308.

8.2–75 551.508(083.75)

Kauf, H., **Normung im meteorologischen Messwesen.** [Standardization in meteorological measurement methods.] *Zeitschrift für Meteorologie*, 10(6):185–188, June **1956.** ref. **DLC**—Detailed standards, including tolerance, are laid down for the construction of autographic instruments for pressure, temperature and humidity. *Subject Heading:* **1. Instrument standardization.**—*C.E.P.B.*

8.2–76 551.508.2:536.42:536.53

Webb, C. G., **The melting point of diphenyl ether as a self-maintaining reference temperature in an equatorial climate.** *Royal Meteorological Society, Quarterly Journal*, 82(354): 518–521, Oct. **1956.** 3 figs., 2 refs., 4 eqs. **DWB**—It is suggested that in a hot climate with a predominant diurnal variation the melting point of diphenyl ether (26.6°C) is a convenient thermocouple reference temperature. A suitable calorimeter is illustrated. *Subject Headings:* **1. Thermocouple standardization 2. Diphenyl ether.**—*C.E.P.B.*

8.2–77 551.508.21

Drummond, A. J., **A contribution to absolute pyrheliometry.** *Royal Meteorological Society, Quarterly Journal*, 82(354):481–493, Oct. **1956.** 6 tables, 21 refs. **DWB**—A number of old and reconstructed Ångström pyrheliometers in S. Africa and Congo were compared. The fundamental pyrheliometric standards of reference in Pretoria, Leopoldville, Stockholm and Washington are in close accord. The original Ångström scale was compared with that of the Abbot actinometer. The ratio Smithsonian/Ångström was 1.035. It is concluded that the original Ångström scale gives values about 1% too low. Two radiometers were also compared using a controlled electrical source of radiation, and good agreement found. *Subject Heading:* **1. Pyrheliometry.**—*C.E.P.B.*

8.2–78 551.508.21 551.521

Wegener, K., **Die Strahlung in der Biologie.** [Radiation in biology.] *Meteorologische Rundschau*, 9(9/10):171–173, Sept./Oct. **1956.** fig., ref. **DWB**—A simple summary for biologists, etc. It deals with principles and working of instruments for solar and total radiation, spectral distribution and its determination. *Subject Headings:* **1. Radiation instruments 2. Radiation research.**—*C.E.P.B.*

8.2–79 551.508.23

Drummond, A. J., **On the measurement of sky radiation.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):413–436, **1956.** 3 figs., 6 tables, 11 refs. English, German and French summaries p. 413–414. **DWB**—The sky pyranograph introduced at 9 stations in S. Africa to record diffuse sky radiation is illustrated. Standardization including correction for shadow-ring used to screen off direct solar radiation, and reduction of the records are described. *Subject Headings:* **1. Radiation instruments 2. Sky pyranographs 3. South Africa.**—*C.E.P.B.*

8.2–80 551.508.25:551.521.16

Drummond, A. J., **Notes on the measurement of natural illumination. I. Some characteristics of illumination recorders.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):437–465, **1956.** 10 figs., 5 tables, 27 refs. English, German and French summaries p. 437–438. **DWB**—Development in the Weather Bureau laboratory at Pretoria of two new instruments is described. They record diffuse daylight and total hemispherical daylight. Report deals with linearity and temperature coefficient of the photoelectric receiver, cosine response, skylight recorder with shadow ring, standardization, correction and reduction. *Subject Headings:* **1. Illumination meters 2. Pretoria, South Africa.**—*C.E.P.B.*

8.2–81 551.508.25:551.521.61

Gebbie, H. A. and Vanasse, G. A., **Interferometric spectroscopy in the far infra-red.** *Nature*, London, 178(4530):432, Aug. 25, **1956.** 2 figs. **DWB**—Experiments are described in response of a thermal detector to resultant intensity of two interfering beams when the optical path-difference to a reflexion interferometer is changed. A 30 cm instrument is suitable for study of atmospheric transmission of submillimeter waves. *Subject Heading:* **1. Infrared spectroscopy.**—*C.E.P.B.*

8.2–82 551.508.79:551.578.11

Jarman, R. T., **Stains produced by drops on filter papers.** *Royal Meteorological Society, Quarterly Journal*, 82(353):352, July **1956.** 4 refs. **DWB**—The theoretical expression given by FOURNIER D'ALBE and HIDAYETULLA for relation between drop (D) and stain (S) diameter (*R.M.S., Q. J.*, 81(350):610–613, Oct. 1955; (*see* 7.4–230, April 1956, *MAB*)) is $D=aS^b$, where b is 2/3. JARMAN quotes some experiments giving $b=0.84\pm0.02$. The value of b is influenced by a number of factors. *Subject Heading:* **1. Raindrop measurement.**—*C.E.P.B.*

8.2–83 551.508.74

Fiedler, H., **Ein Beitrag zur elektrischen Taumessung.** [A contribution to electrical measurement of dew.] *Zeitschrift für Meteorologie*, 10(7):217–219, July **1956.** 5 figs. **DLC**—Electrical recording of dew has several advantages over weighing. An investigation of the method of measuring the change by dew of the electrolytic conductance of a porous porcelain plate is described. Comparisons with the balance method will be carried out. *Subject Heading:* **1. Dew measurement techniques.**—*C.E.P.B.*

8.2–84 551.508.79:551.578.46

LaChapelle, Edward R., **The centrifugal separation of free water from melting snow.** *Journal of Glaciology*, 2(20):769–771, Oct. **1956.** 2 figs., 2 refs. **DWB**—A light hand-operated centrifuge constructed by the U. S. Forest Service is described and illustrated. Sources of error are discussed. *Subject Heading:* **1. Snow cover water content instruments.**—*C.E.P.B.*

8.2–85 551.508.91:551.510.42:551.584.65:622

Science and the coal industry: instrumentation an important factor at the Mining Research Establishment. *Instrument Practice*, London, 10(5):410–416, May **1956.** 7 figs. **DLC**—Among the instruments described are two types of dust samplers, one for continuous collection and the other for sampling. Both act by thermal precipitation and work on lamp batteries. Under "environmental research" are studies of dust production, methane, and heat and humidity. A combined vane anemometer and thermocouple for measuring air speed and moisture content, and an ionization anemometer for low air speeds, are illustrated. *Subject*

Headings: **1. Coal mine instruments 2. Dust collecting techniques 3. Ionization anemometers.**—*C.E.P.B.*

8.2–86 551.508.91

Teichert, F., **Betrachtungen zur Staubmessung in der Meteorologie.** [Dust measurement in meteorology.] *Zeitschrift für Meteorologie*, Berlin, 10(6):161–173, June **1956.** 25 figs., 28 refs. **DLC**—Definition of "dust" (salt particles from evaporation of small droplets are included) and difficulties of measurement are discussed. Measurement is essential on grounds of public health and damage to buildings, etc. Instruments are described. Sedimentation plates coated with adhesive do not give comparable results. A beaker with glass coherer introduced in 1956 at 60 German stations, gives accurate results by weighing the coherer and can be used for chemical analysis. The recording konimeter is fully described and 24-hr dust rings illustrated. Author favors a nozzle of 1 mm diameter with a ring-shaped gap 0.1 mm wide. A number of magnified deposits are illustrated and fully discussed; they include electron microphotographs. Chemical analysis of konimeter rings is described. *Subject Heading:* **1. Dust meters.**—*C.E.P.B.*

8.2–87 551.508.93:551.510.3

Hey, J. S. and Smith, P. G., **A comparison of pulsed and modulated light beam methods of measuring upper atmosphere air densities.** *Great Britain. Ministry of Supply. Radar Research Establishment, R.P.E. Memorandum*, No. 1136. May **1954.** 6 p. fig., 3 refs., 12 eqs. Mimeo. **GB-MO**—The use of light pulses of a few microseconds in a vertical beam with transmitter and receiver less than 250 m apart, to explore density up to 60 km, is discussed. It is found that sensitivity equal to that of the modulated beam method could be attained. *Subject Heading:* **1. Upper atmosphere density measurement.**—*C.E.P.B.*

8.2–88 551.508.95

Martin, A. E., **The sonic gas analyser.** *Nature*, London, 178(4530):407–408, Aug. 25 **1956.** fig., 3 refs., 3 eqs. **DWB**—Two deaf-aid magnetic earpieces are placed at the end of tubes filled with different gases, and actuated by an oscillator. The phase difference of the sound waves is measured electronically, and gives the difference of density. *Subject Heading:* **1. Atmospheric composition measurement.**—*C.E.P.B.*

SYNOPTIC ANALYSIS AND FORECASTING

See also: **Radar and synoptic studies** (Ludlam, Mason), 8.2–65; **Two-parameter model of atmos.** (Bushby, Huckle), 8.2–119; **Forecasting displacement of 500 mb troughs and ridges** (Chic. Univ.), 8.2–135; **Frost forecasting** (Goss, Brooks), 8.2–147; **Pressure variation and weather** (Mügge), 8.2–175.

8.2–89 551.509.1(261.3)

§Rodewald, M., **Ein kurzer "Front-Bericht" von See.** [A short "front report" from sea.] *Wetterlotse*, No. 107:210–212, Oct. **1956.** fig. Also his: **Vom Nutzen *einer* Schiffsmeldung** [On the value of one ship's warning.] *Ibid.*, p. 212–215. 2 figs. **DLC**—On Sept. 12, 1956 in the western Baltic, wind changed from 180° force 4 to 290° force 6. The passage of the occlusion was marked by a rain squall. On Aug. 24, 1956, a ship's report of a small wave depression on a retrograde cold front in the Baltic gave early warning of a severe summer storm. *Subject Headings:* **1. Ships' weather messages 2. Baltic.**—*C.E.P.B.*

8.2–90 551.509.1(261)

§Seilkopf, H., **Der neue Ozeanwetterbericht über Norddeich-Radio 1648 MGZ.** [The new ocean weather report over Norddeich radio.] *Wetterlotse*, No. 106:177–182, Sept. **1956** 2 figs. **DLC**—The Norddeich broadcast, formed by combining those for the southern North Sea and northern fisheries, was extended on Aug. 1, 1956, to the whole North Atlantic. It gives a short report on the weather, including centers of low and high pressure and fronts and a forecast of developments in the next 24 hours. The information is sufficient for synoptic

charts; examples are given. *Subject Headings:* **1. Marine broadcasts 2. North Atlantic.** —*C.E.P.B.*

8.2–91 551.509.1(26)

Swanson, W., **Weather messages from ships via Portishead radio.** *Marine Observer*, 26(174):218–220, Oct. **1956. DLC**—Technical details of organization for dealing with OBS messages. *Subject Heading:* **1. Ships' weather messages.**—*C.E.P.B.*

8.2–92 551.509.312:533.6

Charney, J. G.; Gilchrist, Bruce and Shuman, F. G., **The prediction of general quasi-geostrophic motions.** *Journal of Meteorology*, 13(5):489–499, Oct. **1956.** 5 figs., 11 refs., 37 eqs. **DWB**—Methods are presented for the numerical integration of several rather general approximations to the quasi-geostrophic equations of motion. The choice of the vertical grid interval involved in these approximations is justified by scale considerations. Three of the approximations involve the integration of nonlinear partial differential equations of elliptic type, and the method of solution used is described in some detail because of its quite general applicability. The results of the integrations for each version are presented and compared with those obtained earlier from simple versions. The principal conclusion is that the prediction error is not eliminated by a more refined treatment of the quasi-geostrophic equations, but is at least partly inherent in the geostrophic formulation itself. The retention of terms that are neglected in the first-order geostrophic approximation changes the aspect of the error but does not eliminate it. *Subject Headings:* **1. Numerical forecasting 2. Equations of motion.** —*Authors' abstract.*

8.2–93 551.509.317:551.511

Drimmel, Julius, **Wo ist das äquivalentbarotrope Niveau zu suchen? Zur graphischen Integration der barotropen Wirbelgleichung nach Fjörtoft.** [Where is the equivalent barotropic level to be sought? On graphic integration of the barotropic vorticity equation after Fjørtoft.] *Archiv für Meteorologie, Geophysik und Bioklimatologie. Ser. A*, 9(3):339–342, **1956.** 5 refs. German, English and French summaries p. 339–340. **DWB**—Discusses a paper by F. SANDERS and E. KESSLER (*Amer. Met. Soc., Bull.*, 36:251–255, 1956; *see* 7.2–104, Feb. 1956, *MAB*) criticizing R. FJØRTOFT's graphic integration of the barotropic vorticity equation, and suggests that the latter should be tested on forecasting pressure levels lower than 500 mb before being rejected. *Subject Headings:* **1. Barotropic tendency equation 2. Upper air analysis.**—*C.E.P.B.*

8.2–94 551.509.33

Schell, Irving I., **Further evidence of dynamic persistence and of its application to foreshadowing.** *Journal of Meteorology*, 13(5):471–481, Oct. **1956.** 10 figs., 9 tables, 11 refs. **DWB**—The principle of dynamic persistence set out by the author in *Harvard Meteor. Studies*, No. 8, **1947** (*see* 2B–205, Feb. 1951, *MAB*), is explained. Persistence of fall pressure (tAA) into winter in N. America–Pacific area is related to winter precipitations between Philippines and S.W. Canada, giving correlations of -0.6 to -0.7, but there is no relation to Aleutian Islands and Alaska. Florida-Bermuda-Bahamas have a + correlation with tAA. The hypothesis that these relationships are due to alignments in the pressure field is tested by composite N. Hemisphere sea level pressure charts, and confirmed by + correlations of fall tAA with winter temperatures in N.W. of N. America. The stability of the relations is discussed and further applications are considered. *Subject Heading:* **1. Long range forecasting.** —*C.E.P.B.*

8.2–95 551.509.33:551.311.18(268)

Schell, Irving I., **Interrelations of Arctic ice with the atmosphere and the ocean in the North Atlantic: Arctic and adjacent areas.** *Journal of Meteorology*, 13(1):46–58, Feb. **1956.** fig., 8 tables, 21 refs. **DWB**—Ice data for Icelandic waters, Greenland and Barents Seas are compared with contemporary and subsequent sea and air temperature, precipitation and pressure in northern regions, by season, year and decade. A number of relationships are found and discussed. Generally speaking, much ice is associated with low temperature and small

precipitation at the time and for the 6 following seasons, and with low sea temperature in the N. Atlantic for several years. Less ice in Barents and Greenland Seas in 1921–39 than in 1901–20 was accompanied by a decrease of pressure in the N. Hemisphere. *Subject Headings:* **1. Long range forecasting 2. Arctic sea ice.**—*C.E.P.B.*

8.2–96 551.509.5:632.4:633.491

Uhlig, Siegfried, **Möglichkeiten und Grenzen einer meteorologisch begründeten Phytophora-Warnung.** [Possibilities and limits of Phytophora warnings based on meteorology.] *Annalen der Meteorologie*, 7(1/2):106-109, **1955/56.** 4 figs., ref. Discussion, p. 109-110. **DWB**—Progress of attacks by *Phytophora infestans* and advantages of warnings of favorable weather are described. Decadal frequencies of critical weather (1936–51) in Bavaria according to the temperature-humidity rule and the vapor pressure rule are discussed; more information is necessary. In the discussion, K. UNGER questioned the possibility of defining optimal conditions as there are damp and dry types of infestation. *Subject Heading:* **1. Potato blight forecasting.**—*C.E.P.B.*

8.2–97 551.509.53:551.524.36

Knizek, F. and Reuter, H., **Über den Wärmehaushalt der unteren Luftschichten an heiteren Tagen und die Prognose des Maximums der Lufttemperatur.** [On the heat economy of the lower air layers and the prognosis of the maximum air temperature.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):324–338, **1956.** 7 figs., 4 tables, 11 refs., 9 eqs. German, English and French summaries p. 324–325. **DWB**—The heat balance of the earth's surface is discussed, assuming only vertical heat transport, and a quantity $L = \int\int dQ$ defined. From r/s ascents at Vienna on days of little cloud and light wind the annual variations of L and V (V = gain or loss by condensation/evaporation) and thickness of L layer are found; these give the rise of temperature at the earth's surface from minimum to maximum. It is found that during this period "almost exactly one half of the incoming radiation absorbed at the earth's surface is used for heating the ground and for long-wave back radiation (effective outgoing radiation), the other half for heating the atmospheric layers near the ground and for evaporation." The mean error of forecasts based on these results was 1.2°C. *Subject Headings:* **1. Maximum temperature forecasting 2. Heat balance.**—*C.E.P.B.*

8.2–98 551.509.58:551.576.1:629.135.2

Briggs, J., **Condensation trails formed by jet aircraft.** *Great Britain. Meteorological Research Committee, M.R.P.*, 996, July 20, **1956.** 10 p. 2 figs., 3 tables, 6 refs., 24 eqs. Mimeo. **DWB**—Assuming that heat and water vapor supplied by a jet aircraft mix with the air in a few yards, the critical temperature for initial trail formation in saturated air at pressures 150–500 mb is calculated. The persistence of a trail depends on a number of factors and simple forecasting criteria are difficult to define, but a persistent trail is more likely at high humidity, low temperature and low wind speed. Theoretical critical values of pressure, temperature and wind are given for persistence over at least 10 sec. Reported heights of base or top of persistent trails are tabulated in respect of temperature. *Subject Headings:* **1. Condensation trail forecasting 2. Jet aircraft.**—*C.E.P.B.*

8.2–99 551.509.58:551.543:622.81

Carter, W. H. N. and Durst, C. S., **The influence of barometric changes on the emission of firedamp.** *Institution of Mining Engineers, Transactions*, 115(1):**1955–56.** 29 p. 5 figs., 3 tables, 17 refs. Discussion, p. 20-29. **DLC**—Barometric depressions cause an efflux of methane from cavities in abandoned workings or behind longwall faces in coal mines. An expression is given for the flow across the interface in terms of time and pressure fall and checked by observations in 7 collieries. Longwall wastes in a gassy seam may also emit firedamp. The standard of ventilation necessary to prevent outflow in wastes is described. Warnings can be given 6–24 hrs ahead by forecasting the pressure fall and knowing its effect on rise of methane content. A barograph is also useful. *Subject Headings:* **1. Pressure effects 2. Firedamp 3. Colliery warnings.**—*C.E.P.B.*

8.2–100 551.509.58:551.576.1:629.135.2

Jones, R. F., **The exhaust trail from jet engines.** *Great Britain. Meteorological Research Committee, M.R.P.*, 990, June 30, **1956.** 11 p. fig., 2 tables, 4 refs., eqs. Mimeo. **DWB**—Knowing the rate of burning of fuel, flow of air through the engine, water vapor production (1.3 gm for 1 gm kerosene), temperature and pressure of ambient air and speed, formulas are calculated for temperature T_m and mixing ratio x_m of the exhaust trail and examples quoted. A table gives T_m and x_i, x_w (x_i over ice at 200 mb, x_w over water) for dry ambient air, and a diagram gives also curves for various mixing ratios of ambient air. When the trail is saturated, latent heat of condensation must also be taken into account. Conditions for formation and persistence of a visible trail are then considered. By comparison with observations, it will be possible to forecast the temperature at which, for a particular aircraft, persistent trails are likely or not likely. Finally, the diameter of a trail as a result of entrainment is considered. *Subject Headings:* **1. Condensation trail forecasting 2. Jet aircraft.**—*C.E.P.B.*

ARTIFICIAL PRECIPITATION

8.2–101 551.509.67

Oddie, B. C. V., **The Meteorological Office experiments on artificial rainfall.** *Weather*, 11(3):65–71, March **1956.** fig. **DWB**—The Bergeron process of natural rain formation is explained. Seeding with dry ice and silver iodide is discussed. The experiment with a row of generators on Salisbury Plain is described, including studies of diffusion of zinc-cadmium sulfide particles. Six trials were made but results are not given. *Subject Heading:* **1. Artificial rainfall experiments.**—*C.E.P.B.*

8.2–102 551.509.67

Smith, E. J. and Heffernan, K. J., **The decay of the ice-nucleating properties of silver iodide released from a mountain top.** *Royal Meteorological Society, Quarterly Journal*, 82(353): 301–309, July **1956.** 3 figs., 6 tables, 9 refs. **DWB**—Silver iodide smoke generators (kerosene and hydrogen) were mounted on top o Mt. Wellington, Tasmania (1300 m) and zinc sulfide tracer was dispensed by a dry duster. Distribution was checked by airplane which also took temperature soundings. Freezing nuclei decayed rapidly during daylight but not at night. Rate of decay was not affected by temperature. The width of the smoke plume was about 5 km at 12 km distance and 10 km at 40 km, about half that of plumes released from flat ground. The plumes rose no higher than when released from low ground, the top when measured being at 1200–1800 m. *Subject Headings:* **1. Silver iodide decay 2. Mt. Wellington, Tasmania.**—*C.E.P.B.*

STRUCTURE AND PHYSICS OF THE ATMOSPHERE

See also: **Atmos. density measurement** (Hey, Smith), 8.2–87.

ATMOSPHERIC COMPOSITION

See also: **Science and coal industry,** 8.2–85.

8.2–103 551.510.4:546.33:535.33

Scrimger, J. A. and Hunten, D. M., **Observations of atmospheric sodium in absorption.** *Nature*, London, 178(4536):753–754, Oct. 6, **1956.** 5 refs. **DWB**—Thickness of sodium layer at Saskatoon was estimated from resonance scattering as about 3 $(2.5–8.3)\times10^9$ atoms/cm^2 in winter falling to 1.06–0.88 in April. *Subject Headings:* **1. Sodium absorption 2. Sodium in atmosphere.**—*C.E.P.B.*

ATMOSPHERIC POLLUTION

See also: **Dust in the stratosphere** (Bull, James), 8.2–302.

8.2–104 551.510.42:551.574.1:551.578.11

Gorham, Eville, **On the acidity and salinity of rain.** *Geochimica et Cosmochimica Acta*, London, 7:231–239, **1955.** 9 figs., 3 tables, 10 refs. **DLC, DGL**—Samples of rain collected on

Claife Heights, above western shore of Lake Windermere in May–Oct., 1954, were analyzed. NaCl was often important, especially in fall; this and MgCl were probably derived from sea spray. SO_4, which was correlated with soot, was greatest in spring and probably came from industrial pollution. Ca and K were correlated with each other and with SO_4. Effects on vegetation are discussed. *Subject Headings:* **1. Rain composition 2. Atmospheric pollutants.** —*C.E.P.B.*

8.2–105 551.510.42:634.9

Grayson, A. J., **Effects of atmospheric pollution in forestry.** *Nature*, London, 178(4536): 719–721, Oct. 6, **1956. DWB**—Account of discussion at British Association, Sept. 4, 1956. E. M. CONDER listed suitable trees for industrial areas. A. J. GRAFSON described complicated effects of atmospheric pollution in Yorkshire, need to study country pollution before afforestation, and effects of high wind velocities on lead peroxide method of measurement. G. SCURFIELD discussed reduction of growth by pollutants, pollutants responsible and physiological cause (leaf abscission). P. S. WAREING also stressed that leaves are the most susceptible parts. A. BLEASDALE asked that foresters should state specific requirements from meteorologists. *Subject Headings:* **1. Atmospheric pollution effects 2. Forestry.**—*C.E.P.B.*

8.2–106 551.510.42:551.551:551.558.1

Meade, P. J. and Priestley, C. H. B., **The bent-over plume of hot gas.** *Royal Meteorological Society, Quarterly Journal*, 82(354):526–528, Oct. **1956.** table, 4 refs., eq. **DWB**—Referring to PRIESTLEY, **A working theory of the bent-over plume of hot gas** (*R. Met. Soc., Q. J.*, 82(352):165–176, April **1956**; *see* 7.9-130, Sept. 1956, *MAB*) MEADE quotes his own formula for the decay of vertical velocity in a stream of hot gas in calm air, and applies it to PRIESTLEY's data, with improved agreement. PRIESTLEY objects to MEADE's treatment and refers to subsequent observations which support his own formula. *Subject Heading:* **1. Smoke plumes.**—*C.E.P.B.*

8.2–107 551.510.42:620.19

Parker, A., **The destructive effects of air pollution on materials.** London, National Smoke Abatement Society, **1955.** 15 p. 7 figs., table. **DWB**—The history of air pollution investigation in Britain is set out. Amounts of pollutants discharged by domestic fires and various other installations are tabulated; they amount to 2 million tons of smoke, 1.3 million of grit and dust and 5.4 million of SO_2. There is also about 25 million tons of CO. The annual and spatial distributions are described. In large cities concentration of smoke near ground may exceed 1 mg/m³, and several times as much in smog. Soiling of buildings by grit, dirt and smoke, and damage by sulfurous and sulfuric acid (SO_2 + water) to buildings, paint and fabrics are described; carbonates are especially liable to exfoliation by acids; metals, leather, paper, etc. are also attacked. The damage is at least £250 million a year. *Subject Headings:* **1. Atmospheric pollution effects 2. Smog effects 3. Great Britain.**—*C.E.P.B.*

8.2–108 551.510.42:551.575.5:616

Smithard, E. H. R., **The 1952 fog in a metropolitan borough.** *Great Britain. Ministry of Health, Monthly Bulletin*, 13:26–35, **1954.** 4 figs., 4 tables. **DSG**—Description of fog in Lewisham, S.E. London. The sources of smoke are listed. Autumn had been cold and wet, predisposing to sickness. Fog began Dec. 2 and sickness figures continued to rise. The main cause of mortality was an increase of respiratory disease. Deaths increased more in S.W. than in N.E. probably because a valley runs through S.W. and there are sources of excessive smoke. *Subject Headings:* **1. Atmospheric pollution effects 2. Fog mortality 3. London, Eng.**—*C.E.P.B.*

8.2–109 551.510.42:551.575.5:551.586:616.23

Waller, Robert E. and Lawther, Patrick, J., **Some observations on London fog.** *British Medical Journal*, **1955**:1356–1358. 2 figs., 2 tables. **DSG**—On Jan. 19, 1955, visibility at Kingsway fell to 70 yds, though relative humidity was only 50–76%, concentration of black smoke particles (44% tar) was 5–6 mg/m³, of SO_2 0.6–0.7 p.p.m. There were rapid wide variations during the day. Fog was accompanied by temporary deterioration of bronchitic patients. *Subject Headings:* **1. Smog 2. Bronchitis 3. London, Eng.**—*C.E.P.B.*

UPPER ATMOSPHERE—IONOSPHERE

See also: **Average wind at 60 mb** (Bannon, Jones), 8.2–198; **Motion of sporadic-E patches** (Clark, Peterson), 8.2–199; **Remarks on "Ionospheric wind determination . . ."** (Pütter, Court), 8.2–201; **Effects of eclipse of Feb. 23, 1956 on ionosphere** (Minnis et al.), 8.2–291; **Effects of eclipse of June 30, 1954 on ionosphere** (Minnis), 8.2–292; **Radio star scintillation-ionosphere relationships** (Wild, Roberts), 8.2–298; **Oxygen in the twilight sky** (Wark), 8.2–304; **Solar eclipse effects on ionosphere** (Minnis), 8.2–309; **Eclipse effects on ionosphere** (Szendrei, McIlhinny), 8.2–310.

8.2–110 551.510.5:519.2 551.557:551.501.7

Goldie, N., **Frequencies and correlation in upper air data.** *Meteorological Magazine*, London, 85(1012):299–311, Oct. **1956.** 8 figs., 3 tables, 14 refs. **DWB**—Tropopause height, frequency diagrams, correlation and scatter diagrams are illustrated and their application to upper air statistics described, beginning with W. H. Dines. A bimodal distribution of temperature at Larkhill, 200 mb, is shown and the method of fitting by probability paper explained. Correlation surfaces are illustrated (tropopause height with 150 mb and 500 mb temperature). Frequency distributions of vectors (upper winds) are shown and the computation of a wind rose from vector mean wind and average scalar speed explained. *Subject Headings:* **1. Upper air statistical analysis 2. Upper air wind analysis 3. Statistical methods.**—*C.E.P.B.*

8.2–111 551.510.52:551.513.1

†Schneider-Carius, K., **Grundschicht und Nullschicht, zwei polare Schichtbildungen in der Troposphäre.** [Ground layer and zero layer, two polar layers in the troposphere.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):305–323, **1956.** fig., 3 tables, 31 refs. German, English and French summaries p. 305–306. **DWB**—The term "polar" is not used in the geographical sense, but for the extremes of a dynamic system. The ground layer occupies 1–3 km of the lower troposphere, including the peplopause, in which the ageostrophic component from high to low pressure is found; the wind is hypogeostrophic. In the zero (neutral) layer of H. Faust (300–250 mb) interdiurnal temperature variation reaches a minimum, slope of pressure surfaces and ageostrophic component from low to high pressure a maximum. The wind is hypergeostrophic, on the mean by 10%, (e.g., jet stream). The ageostrophic motion was long known from the motion of cirrus, but Faust first showed its meaning. The ground and zero layers are the active ones; the middle troposphere is more passive. In it the layers swell and shrink vertically and inversions are rare, especially in 4–7 km. This is the divergence-free "adaptation level" between pressure and wind fields. Coherence between high and low is shown schematically; in the ground layer air is "pumped" from high to low, in the zero layer from low to high. The "polarity" of the system maintains a quasi-stationary equilibrium. *Subject Headings:* **1. Tropospheric structure 2. Cyclone-anticyclone structure.**—*C.E.P.B.*

8.2–112 551.510.53:541.12:551.594.5

Omholt, A., **The recombination coefficient in the E-layer during aurorae.** *Journal of Atmospheric and Terrestrial Physics*, 7(6):345–346, Dec. **1955.** table, 5 refs., 7 eqs. **DWB**—The upper limit n_e of electron density in the E layer is given by $q=\alpha n_e^2$, in which α increases in auroras. This may be due to a high negative-ion/electron ratio in auroras. Some calculations are made on this basis. *Subject Headings:* **1. Recombination processes 2. Auroral effects on ionosphere.**—*C.E.P.B.*

8.2–113 551.510.534(234.3)

Paetzold, H. K. and Zschörner, H., **Beobachtung eines "Ozonloches" über den Alpen.** [Observation of an "ozone window" over the Alps.] *Zeitschrift für Meteorologie*, 9(8):250–251, Aug. **1955.** 2 figs., 3 refs. **DWB, DLC**—On Nov. 17, 1953, a series of spectra of sunlight from Zugspitze with very low sun gave the thickness of the ozone layer as 0.16 cm at $z=88°$, decreasing to 0.09 at $z=79$. By 11h 40m the value had increased again to 0.16 cm. The drop is attributed to a marked local distribution of the ozone layer, the "window" being over the Carnic Alps in a föhn wave. *Subject Headings:* **1. Ozone variations 2. Zugspitze, Austria.**—*C.E.P.B.*

8.2–114 551.510.535:551.594.12

Beynon, W. J. G. and Thomas, J. O., **The calculation of the true heights of reflection of radio waves in the ionosphere.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):184–200, Oct. 1956. 17 figs., 24 refs., 17 eqs. **DWB**—Electron density in E, F1 and F2 layers is represented by a series of more or less contiguous truncated parabolic sections. An expression is derived for the variations of virtual height with frequency, the parameters being calculated and shown in curves. A numerical example is worked out, giving true height distribution calculated from observed cusp frequency, number of electrons and calculated virtual heights for different wave lengths compared with observed heights. *Subject Heading:* **1. Ionospheric electron density.**—*C.E.P.B.*

8.2–115 551.510.535:525.6:523.3

Brown, R. A., **Lunar variations of the F2 layer at Ibadan.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):144–154, Aug./Sept. 1956. 4 figs., 3 tables, 11 refs., 6 eqs. **DWB**—Mean monthly values of h_mF2, y_mF2, f_0F2 and h'F2 were analyzed and harmonic dials of the mean lunar semidiurnal tides, their seasonal variation and luni-solar effects are constructed. The lunar tides are similar to those found by D. F. MARTYN at Huancayo but advanced in phase, and different from higher latitudes. They show large changes of amplitude and phase during the solar day. Values of recombination and attachment coefficients are computed from the luni-solar effects; the former are consistent with an exponential decrease with height. *Subject Heading:* **1. Lunar ionospheric tides.**—*C.E.P.B.*

8.2–116 551.510.535

Dungey, J. W., **The effect of ambipolar diffusion in the night-time F layer.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):90–102, Aug./Sept. 1956. 3 figs., table, 14 refs., 8 eqs. **DWB**—Since the density of neutral particles in the F region is now thought to be smaller than previous estimates, ambipolar diffusion is expected to have an important influence on the behaviour of the F layer. Its theoretical investigation is greatly simplified by the assumption that the rate of loss of electrons is proportional to the first power of the electron density N for which strong evidence has recently been found; this assumption makes the problem linear. Motion of the ionization, other than diffusion, may be approximated by a vertical velocity w, independent of height. With the unreal assumption that w is also constant in time, the general solution for N as a function of height and time can be expressed as a sum of functions which decay exponentially with time and which have arbitrary coefficients. The most slowly decaying of these provides a model which is discussed in this paper; it is very similar to a Chapman layer. Although the observed part of the layer can be closely fitted by a parabola, it is found that little fundamental information can be derived without obtaining true $N-h$ curves, except that the parabolic width gives quite a good measure of the scale height. This is used to study the sunspot-cycle variation of F region temperature, and correlations are found with both f_0F1 and the magnetic C figure. *Subject Headings:* **1. F layer 2. Ionospheric diffusion.**—*Author's abstract.*

8.2–117 551.510.535:551.590.24

Moller, H. G., **Sweep-frequency oblique-incidence experiments over a distance of 1320 km.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):155–156, Aug./Sept. 1956. 2 refs. **DWB**—Half-hourly sweep frequency records were made between Lindau and Helsinki, across path of eclipse totality, on 1–16 Mc/s in 1954. Effects of eclipse on F1 and F2 paths were distinct, none on E layer. Results are briefly described. *Subject Heading:* **1. Ionospheric eclipse effects.**—*C.E.P.B.*

8.2–118 551.510.535:621.396.8(213)

Skinner, N. J. and Wright, R. W., **Equatorial ionospheric absorption.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):103–117, Aug./Sept. 1956. 7 figs., table, 18 refs., 7 eqs. **DWB**—Measurements of ionospheric absorption were made at Ibadan, Nigeria, mag. lat. $2\frac{1}{2}$°S by apparent reflection coefficient at noon. Total absorption shows a linear relation of $-\log_e \rho/F$ with $1/f^2F$ instead of $1/f$. Variation with sun's zenith distance was proportional to $(\cos \chi)^{0.7}$ instead of $(\cos \chi)^{1.5}$. These discrepancies with theory are attributed

to absorption in a Chapman-type D layer. Results are compared with those from Singapore, Slough, Falkland Islands and Prince Rupert. *Subject Headings:* **1. Ionospheric absorption measurement 2. Equatorial ionosphere 3. Ibadan, Nigeria.**—*C.E.P.B.*

MECHANICS AND THERMODYNAMICS OF THE ATMOSPHERE

See also: **Equivalent barotropic level** (Drimmel), 8.2–93.

8.2–119 551.511:551.509.317:681.14

Bushby, F. H. and Huckle, Vera M., **The use of a stream function in a two-parameter model of the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 82(354):409–418, Oct. **1956.** 2 figs., 3 refs., 7 eqs. **DWB**—A better approximation to horizontal non-divergent flow than the geostrophic is derived from a Monge-Ampere type of differential equation (similar to CHARNEY's) with some simplifications. This was tested by comparing the pressure field computed from the stream function with the actual. The stream function was then used for three 24-hr prognostics of the 500 mb level and 500–1000 mb thickness (Atlantic and Europe) based on the SAWYER-BUSHBY 2-parameter model. These were comparable with or better than forecasts without the stream function. Time by electronic computer was increased from 3½ to 4 hrs. *Subject Headings:* **1. Stream functions 2. Numerical forecasting techniques.**—*C.E.P.B.*

8.2–120 551.511:551.551

Dryden, Warren A., **On the flux of eddy energy in small-scale turbulent motion.** *Journal of Meteorology*, 13(5):433–447, Oct. **1956.** 9 figs., 20 refs., 41 eqs. **DWB**—A. K. BLACKADAR's extension of the second law of thermodynamics to turbulent systems (*J. Meteor.*, 12:165–175, **1955**; *see* 6.8–248, Aug. 1955, *MAB*) is discussed and an experiment described to show that eddy energy proceeds from higher to lower values. The equations of relative flux of eddy energy are developed; the terms have been measured. Results of relative flux and negative eddy energy are graphed; some striking agreements are found. A few apparent violations are explained as due to the intrusion of other factors. Each experiment fitted a power law, but the powers differed. A study of turbulence in a low-speed free jet of air is fully described. *Subject Heading:* **1. Eddy flux.**—*C.E.P.B.*

8.2–121 551.511:551.554

Lettau, H. and Businger, J. A., **Note on the structure of the atmospheric surface layer.** *Journal of Meteorology*, 13(5):507–510, Oct. **1956.** fig., 8 refs., 16 eqs. **DWB**—Referring to BUSINGER's paper in *J. Meteor.*, 12:553–561, **1955** (*see* 7.5–109, May 1956, *MAB*), LETTAU uses Great Plains Turbulence Field data to plot relation between Richardson number and a function $\beta = -zV''/V'$. The result fits LETTAU's theory better than BUSINGER's modification of it. BUSINGER objects that the comparison is not entirely fair, his own theory being kept as simple as possible. LETTAU comments further. *Subject Headings:* **1. Turbulence in the frictional layer 2. Wind profile theory.**—*C.E.P.B.*

GENERAL CIRCULATION

See also: **Ground layer and zero layer** (Schneider-Carius), 8.2–111; **Cold pole-atmos. circulation relationships** (Maede), 8.2–171.

8.2–122 551.513(211.2)

Britton, G. P. and Lamb, H. H., **A study of the general circulation of the atmosphere over the far South.** *Weather*, 11(9):281–291, Sept. **1956.** 3 figs., 2 tables. **DWB**—Twice-daily S. Hemisphere charts for summer and fall 1946–7 and 1947–8 were prepared and analyzed at R. Naval Weather Center, Simonstown, S. Africa. Particular attention is given to frequency of highs over Antarctica. Encroachment of cyclones is due either to southward displacement of subtropical anticyclones or to very large sub-Antarctic depressions. Charts show frequencies and tracks of depressions and frequencies of anticyclones. The main anti-

cyclonic center was over E. Antarctica in 85°S, the center of the ice-covered area. To be concluded. *Subject Headings:* **1. Atmospheric circulation 2. Southern Hemisphere 3. Antarctica.**—*C.E.P.B.*

8.2–123 551.513(211.2)

Britton, G. P. and Lamb, H. H., **A study of the general circulation of the atmosphere over the far South, Pt. 2.** *Weather*, 11(11):339–354, Nov. **1956.** 3 figs., 3 tables, 22 refs. **DWB**—Evidence from pressures is adduced that Antarctica is not constantly anticyclonic; some deep depressions have been reported especially in winter. Anticyclones occur mainly over the broadest part. A map of mean pressure at sea level over the S. Hemisphere is given. The constant strong SE or ESE winds at Adélie Land and other places are attributed to channeling. The surface wind components round the globe in 60–67½°S are plotted; they are mainly southerly, while upper winds are northerly. Annual variation of W/E ratio is shown at S. Orkneys (60°44′S, mainly westerly) and Ross Sea (78°S, easterly). In 88°S, 150°E–160°W, the prevailing southerly winds blow up the ice slope. Winds on plateau journeys are analyzed. Four types of circulation in Antarctica are distinguished: anticyclonic, mixed, depressions with warm sectors (mainly off the coast) and cold depressions. A postscript shows that the French daily charts for 1951 (R. LE QUINIO) confirm these conclusions. *Subject Headings:* **1. Atmospheric circulation 2. Southern Hemisphere 3. Antarctic.**—*C.E.P.B.*

8.2–124 551.513:551.573:551.577

Sutcliffe, R. C., **Water balance and the general circulation of the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 82(354):385–395, Oct. **1956.** 3 figs., 3 tables, 31 refs. **DWB**—A general discussion of the circulation of water in the atmosphere. Author deals first with condensation and precipitation as a major factor in the general circulation of the atmosphere. He next states the difficulties of regional estimation of evaporation. Various estimates of world precipitation and evaporation over land and sea are quoted and the northward flux of vapor in 31°–70°N discussed. World charts of mean moisture content in Jan. and July by J. K. BANNON are reproduced; the average is 2.5 cm compared with some 90 cm precipitation. Finally, the radiation balance is briefly considered. *Subject Headings:* **1. Hydrologic cycle 2. Meridional circulation.**—*C.E.P.B.*

8.2–125 551.513

*Trenkle, H., **Näherungswerte der Zonalgeschwindigkeit im atlantisch-europäischen Sektor für den Zeitraum 1881–1955.** [Approximate values of the zonal velocity in the Atlantic-European sector for 1881–1955.] *Meteorologische Rundschau*, 9(9/10):153–156, Sept./Oct. **1956.** 2 figs., 7 tables, 4 refs. **DWB**—Average zonal wind components at 500 mb in 50–60°N 1948–1955 are tabulated for each month and for each of 15 general weather types of Europe. Taking account of these and of the following temperature and precipitation in Central Europe, approximate zonal winds are computed for each month, Oct.–March, 1881–1947. *Subject Heading:* **1. Zonal winds.**—*C.E.P.B.*

8.2–126 551.513.1

Defant, Albert, **Atmosphärische und ozeanische lange Wellen und Wirbelstörungen und ihre Ähnlichkeit mit Trägheitsbewegungen.** [Long waves and vorticity in the atmosphere and ocean and their resemblance to inertia motions.] *Deutsche Hydrographische Zeitschrift*, 9(2):49–55, **1956.** 2 figs., 5 refs., 20 eqs. German, English and French summaries p. 49. **DWB**—The complete correspondence of the inertia motions, as derived by F. J. W. WHIPPLE [1917] for the equatorial zone of the earth, with ROSSBY's "long waves" in a broad stable eastward setting current and with the vorticity phenomena in a westward directed instable current calls for an explanation, especially so as in both cases the underlying physical conditions are of a different nature. This explanation is given in the present paper. Besides, the inertia motion on the revolving earth is derived from motions occurring on one hemisphere only and a mathematically simple formula of this is given. Finally, in drawing attention to the different current stability of westward and eastward setting currents, emphasis is laid on their relation to the aforementioned long waves and vorticity phenomena after ROSSBY. *Subject Headings:*

. Long waves 2. Dynamic meteorology 3. Dynamic oceanography 4. Vorticity.—*Author's abstract.*

8.2–127 551.513.2:551.557(52)

Arakawa, H., **Characteristics of the low-level jet stream.** *Journal of Meteorology*, 13(5): 504–506, Oct. **1956.** 3 figs., 4 refs. **DWB**—Rawinsondes from Honjo are also followed from Tateno, 88 km to ESE (downstream), enabling balloons to be followed longer. A dot diagram shows winds Feb. 1–15, 1953, plotted against height. Maximum speed (>60 m/s) always occurred near 11 km (200 mb), but in bad weather there is a secondary maximum near 7 km, which is termed the low-level jet stream. The thermal structures of the two types are shown schematically and the second by an actual example. *Subject Headings:* **1. Jet stream height 2. Low level jet stream 3. Japan.**—*C.E.P.B.*

8.2–128 551.513.2:551.557(59)

Emery, P. F., **Strong winds at high levels in the equatorial zone of the Far East.** *Meteorological Magazine*, London, 85(1011):275–277, Sept. **1956.** table, 2 refs. **DWB**—Aircraft in Malaya region report that there is often a narrow core of E winds, sometimes >75 kt, between 40,000 and 55,000 ft in May–July, with light or west winds above. Examples of radar winds are tabulated for comparison. *Subject Headings:* **1. Easterly jet stream 2. Southeast Asia.**—*C.E.P.B.*

8.2–129 551.513.2:551.557:629.13

Heines, J. M., **Jet stream navigation.** *Shell Aviation News*, London, No. 212:14–18, **1956.** 5 figs. **DLC**—The history, properties and origin of jet streams are summarized. The source of energy is mainly in warm air masses flowing towards the poles, and partly in precipitation and absorption of infrared radiation by ozone. The properties of the jet are described, location is mainly on upper fronts. Tropopause discontinuity, dynamics and jet stream wanderings and branchings are described. The dynamic effect of mountain ranges and distribution of turbulence are discussed. Practical details about location and navigation are given. The "Jet Stream Forecasting Manual in preparation (Univ. Chicago) is described. *Subject Heading:* **. Jet stream navigation.**—*C.E.P.B.*

ATMOSPHERIC DISTURBANCES

See also: **Radar and synoptic studies of precipitating clouds** (Ludlam, Mason), 8.2–65; **Thunderstorm location** (Clarke, Byrne), 8.2–67; **Gale of July 29, '56** (Sutton), 8.2–188; **Icing of aircraft in warm fronts** (Best), 8.2–219.

8.2–130 551.515:551.542

Haarlander, H., **Quasigeostrophische Theorie nichtstationärer Druckfelder in einer baroklinen Atmosphäre mit Bodenreibung.** [Quasi-geostrophic theory of nonstationary pressure fields in a baroclinic atmosphere with surface friction.] *Meteorologische Rundschau*, 9(9/10):158–164, Sept./Oct. **1956.** 15 refs., 58 eqs. **DWB**—In this highly mathematical paper G. Hollmann's differential equations of development of stationary pressure formations in a frictionless atmosphere are extended to moving pressure fields in an atmosphere with surface friction. The results agree with synoptic experience in having a sloping axis and temperature extremes out of phase with pressure extremes. The temperature change is reversed from troposphere to stratosphere and there is a null layer at the tropopause. A numerical example will be presented later. *Subject Headings:* **1. Development theory 2. Pressure fields.** —*C.E.P.B.*

8.2–131 551.515(261.2/3)

Rodewald, M., **Die Schwankungen der Sturmhäufigkeit.** [Variations of storm frequency.] *Wetterlotse*, No. 107:215–216, Oct. **1956.** table. **DLC**—Aug. 1956 was unusually stormy in German waters. The % frequency of storms is tabulated for Sept.–Feb. 1922–1956 to show great variation (Jan. 22–0, Feb. 12–0). *Subject Headings:* **1. Storm frequency data . North Sea 3. Baltic Sea.**—*C.E.P.B.*

8.2–132 551.515.1:551.461.2:517.515.2:525.63

Darbyshire, J. and Darbyshire, Mollie, **Storm surges in the North Sea during the winter 1953–4.** *Royal Society of London, Proceedings, Ser. A*, 235(1201):260–274, April 24, **1956.** 10 figs., 5 tables, 17 refs., eqs. **DWB**—Sea level fluctuations at a number of ports on both sides of the North Sea were analyzed for nonastronomical periods for five 14-day intervals, Oct. 27, 1953 to Jan. 4, 1954. After subtracting predicted tides a number of surges were found travelling south down the North Sea and partly reflected at the coast. These showed a high correlation with pressure differences Felixstowe–Esbjerg, Felixstowe–Aberdeen and (Wick–Bergen)/dt, the latter representing a traveling disturbance from the Atlantic. Some suggestions are made for forecasting. *Subject Headings:* **1. Storm surges 2. North Sea.** —*C.E.P.B.*

8.2–133 551.515.11

†Kühn, U., **Die kalten Höhenzyklonen der Nordhalbkugel.** [The cold upper cyclones of the Northern Hemisphere.] *Beiträge zur Geophysik*, 65(3):246–262, **1956.** 18 figs., 48 refs. **DLC, DWB**—The distribution of cold upper air cyclones in 1949–52 is plotted for each month. The frequency is shown by 40° sectors around the pole; it is greatest over Baffin Land and N.E. Asia, the sites of the great northern upper troughs, and over S. Europe. The Atlantic is almost free except for an occasional trough cut-off off W. Europe. Over Europe there is a double wave with maximum frequency in early summer (May 24, June 23/yr) and Sept. (21–22) and minimum in Nov.–Feb. Accompanying synoptic types for cold upper cyclones over central Europe show greatest frequency with high pressure belts or anticyclones over North Sea or N. Europe. *Subject Headings:* **1. Cold lows aloft 2. Northern Hemisphere.** —*C.E.P.B.*

8.2–134 551.515.11

Piper, Horst, **Beitrag zum Verhalten der kinetischen Energie bei Zyklonenvertiefung.** [Contribution to the maintenance of kinetic energy during deepening of cyclones.] *Meteorologische Rundschau*, 9(9/10):157–158, Sept./Oct. **1956.** 2 figs., 4 tables. **DWB**—On Dec. 7–8, 1954, a weak depression deepened by >40 mb in 24 hrs. The kinetic energy at 6 levels on each day is calculated. The change varied from +514% at 1000 mb to −43% at 500 mb and −28% at 96 mb. *Subject Heading:* **1. Cyclone development.**—*C.E.P.B.*

8.2–135 551.515.13:551.509.312

Chicago Univ. Weather Forecasting Research Center, **An experiment in forecasting the displacement of 500-millibar troughs and ridges.** *Journal of Meteorology*, 13(5):421–432, Oct. **1956.** 11 figs., 6 tables, 19 refs. **DWB**—A team led by C. W. Newton computed 24 and 48 hr motion of 500 mb troughs and ridges, Jan. 24–March 14, 1955, by: 1. Linear extrapolation, 2. Climatological mean, 3. Extrapolation of acceleration in past 24 and 48 hours, 4. Grid method of Riehl modified by H. P. Wilson, 5. Petterssen's wave formula, 6. Rossby's long-wave formula, 7. Constant absolute vorticity trajectories, 8. Pressure-kinematic extrapolation by Petterssen's formula, 9. Fjørtoft's barotropic graphical technique. The relations between observed and computed movement and acceleration are shown by dot diagrams. Nos. 4, 5, 6 and 8 were significantly better than linear extrapolation (which is rarely justified), but in some cases they gave misleading results. *Subject Headings:* **1. Upper level trough movement forecasting 2. Upper level ridge forecasting.**—*C.E.P.B.*

8.2–136 551.515.3

de Jong, J. J. G., **Eighteen waterspouts over the Yssellake (Netherlands) at the same time.** *Weather*, 9(1):23–24, Jan. **1954.** fig. **DWB**—Description, with sketch, of developments from a low hanging shower cloud on Aug. 17, 1953. *Subject Headings:* **1. Waterspouts 2. Netherlands.**—*C.E.P.B.*

8.2–137 551.515.3

Dust devil on Cavenham Heath, April 23, 1956. *Meteorological Magazine*, London 85(1011):273, Sept. **1956.** 2 photos. **DWB**—Two photos of a dust whirl moving N.E. over Suffolk at noon. *Subject Headings:* **1. Dust devils 2. Suffolk, Eng.**—*C.E.P.B.*

8.2–138 551.515.3

Maclaren, C. F., **Whirlwind at Mitcham, May 18, 1956.** *Meteorological Magazine*, London, 85(1011):272–273, Sept. 1956. fig. **DWB**—A small whirlwind travelling N.E.–S.W. at 9 p.m. in unstable cold air lifted iron roof of a shed over a two-story house. *Subject Headings:* **1. Whirlwinds 2. Mitcham, Eng.**—*C.E.P.B.*

8.2–139 551.515.3

Ross, J., **Dust devil observed at Coalburn, Lanarkshire.** *Meteorological Magazine*, London, 85(1009):215–216, July 1956. **DWB**—On April 29, 1956, a short-lived clockwise whirlwind carrying grass and twigs, 5 ft across and 10–12 ft high, came from N.E. at 15 m.p.h. Unstable air gave liability to convection, which was set off by solar radiation on a flat expanse of ashes. *Subject Headings:* **1. Dust devils 2. Scotland.**—*C.E.P.B.*

8.2–140 551.515.3

Waterspout in the Red Sea, and in the North Atlantic Ocean. *Marine Observer*, 24(165): 138, July 1954. photo, sketch. Also . . . **in Mediterranean Sea and in North Atlantic Ocean.** *Ibid.* 25(170):210–211, Oct. 1955. 5 figs. Also . . . **Mediterranean Sea, in Strait of Hormuz and in West African waters.** *Ibid.* 26(171):12–13, Jan. 1956. 5 figs. Also . . . **in West African Waters and in Mozambique Channel.** *Ibid.* 26(172):81–82, April 1956. Also . . . **in North Atlantic Ocean, in Mediterranean Sea and in Bass Strait.** *Ibid*, 27 (174): 200–201, Oct. 1956. photo, 2 figs. **DLC**—Descriptions, photos and sketches of the several waterspouts observed. *Subject Heading:* **1. Waterspouts.**

8.2–141 551.515.8:551.558.1:551.558.21:551.551

Wallington, C. E., **The sixth O. S. T. I. V. Congress: a report on the meteorological discussions.** *Royal Meteorological Society, Quarterly Journal*, 82(354):522–525, Oct. 1956. 7 refs. **DWB**—The papers at the Congress of the Organisation Scientifique et Technique Internationale du Vol à Voile at St. Yan, France, 6–13 July 1956 are summarized at some length. They included jet streams and squall lines, convection, atmospheric waves and turbulence. Several have been published elsewhere. *Subject Headings:* **1. Conferences 2. Gliding meteorology.**—*C.E.P.B.*

RADIATION AND TEMPERATURE

RADIATION

See also: **Radiation nomogram** (Fett), 8.2 60; **Cloud amount and sunshine** (Tribble), 8.2–62; **Radiation in biology** (Wegener), 8.2–78; **Natural illumination** (Drummond), 8.2–80; **Interferometric spectroscopy** (Gebbie, Vanasse), 8.2–81; special bibliography on **Night Airglow**, p. 213.

8.2–142 551.521

*Fleischer, Richard, **Der Jahresgang der Strahlungsbilanz und ihrer Komponenten.** [The annual variation of the radiation balance and its components.] *Annalen der Meteorologie*, Hamburg, 6(11/12):357–364, **1953/54,** pub. 1955. 5 figs., table, 8 refs., eqs. German and English abstracts p. 357. **DWB**—The Schulze radiation balance meter in use at Hamburg is described and the daily values and 10-day means Feb. 1954–Jan. 1955 of infrared terrestrial radiation E, long wave atmospheric counter radiation A, incoming global radiation $S+H$, that reflected from earth's surface R, and radiation balance Q are plotted. The annual means and extremes of these quantities are tabulated and discussed. The mean daily sums in cal/cm² are: E 737, A 659, $S+H$ 213, R 39, Q calc. 96, Q obs. 100. Q is positive except from late Nov. through Jan.; its limits are $(S+H)-.16(S-H)$ and $.84(S+H)-189$. *Subject Headings:* **1. Radiation balance 2. Hamburg.**—*C.E.P.B.*

8.2–143 551.521:551.584.61:631.2

Seemann, —, **Strahlung im Gewächshaus.** [Radiation in the greenhouse.] *Germany. Deutscher Wetterdienst. Klima-Schnellmeldedienst*, No. 13:136–137, March 21–27, **1955.** fig. **GB-MO**—Greenhouse glass only passes radiation in the range 320–2800 mμ; long wave radia-

tion from soil and plants is intercepted. Within this range there are losses by reflection and absorption in the glass and interception by the framework and by dirt on the glass. The total loss in an industrial area (Ruhr) is up to 56%. The loss of light in winter should be made good by auxiliary lighting. *Subject Heading:* **1. Greenhouse radiation.**—*C.E.P.B.*

8.2–144 620.9:551.521.1(08)

Meffert, M. E. and Stratmann, H., **Das Welt-Symposion für angewandte Sonnenenergie in Phoenix und Tucson, Arizona 1955.** [The world symposium on applied solar energy . . . 1955.] *Naturwissenschaftliche Rundschau*, Stuttgart, 9(6):232–235, June **1956. DWB**—The account of the scientific basis is set out under: heat utilization, photochemical processes, electrical processes, and measurement of (solar and sky) radiation. At Phoenix various practical problems were discussed. A number of papers are summarized. *Subject Headings:* **1. Solar energy utilization 2. Solar energy symposia.**—*C.E.P.B.*

8.2–145 620.9:551.521.1

Trombe, Félix, **Utilisation de l'enérgie solaire.** [Utilization of solar energy.] *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 75–78. **DWB**—Over large cloudless areas the energy from the sun is about 1 kw m^{-2}. This can be used by natural photosynthesis or in solar furnaces. The construction of a cheap parabolic reflector giving 3000°C is described. Other researches are in distillation of water and in refrigeration. *Subject Heading:* **1. Solar energy utilization.**—*C.E.P.B.*

8.2–146 551.521.13

Johnson, Francis S., **The solar constant.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 71–74. fig., 12 refs. **DWB**—The best value of the solar constant, corrected for radiation outside the Smithsonian range, from rocket and other data is 2.00 cal $cm^{-2}min^{-1}$ ±2%. The solar illuminance constant is 13.67 lumens cm^{-2}. The spectral distribution from 2000 to 30,000Å is shown. *Subject Heading:* **1. Solar constant.**—*C.E.P.B.*

8.2–147 551.521.32:551.509.532

Goss, John R. and Brooks, F. A., **Constants for empirical expressions for downcoming atmospheric radiation under cloudless sky.** *Journal of Meteorology*, 13(5):482–488, Oct. **1956.** 5 figs., table, 11 refs. **DWB**—Constants in BRUNT's formula for nocturnal radiation $R/\sigma T^4 = a + be^{\frac{1}{2}}$ were determined for interior valleys of California by continuous records of atmospheric down radiation under cloudless skies, local 14 h vapor pressure and average nocturnal air temperature. Observational technique is described and results presented. Correlation gave $R/\sigma T^4 = 0.66 + 0.039e^{\frac{1}{2}}$. This gave downcoming nocturnal radiation to ±3%. One sounding during radiation frost gave good agreement, but another gave too high a value, owing to a strong ground inversion. *Subject Headings:* **1. Atmospheric radiation 2. Frost forecasting 3. California.**—*C.E.P.B.*

8.2–148 551.521.4:551.594.5

Ashburn, Edward V., **Measurement of auroral radiation 3200 Å with a photon counter (Geiger tube).** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):156–157, Aug./Sept. **1956.** ref. **DWB**—Radiations on 3161 Å and 3140 Å were counted in a strong auroral display at College, Alaska. Results were satisfactory and showed that photon emission/cm^2/sec was at least 100 times that for 5577 Å airglow in middle latitudes. *Subject Headings:* **1. Auroral luminescence 2. College, Alaska.**—*C.E.P.B.*

8.2–149 551.521.4:546.33

Chamberlain, Joseph W., **Theory of the intensity plateau in the twilight airglow. (Resonance scattering by atmospheric sodium, Pt. 1.)** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):73–89, Aug./Sept. **1956.** 6 figs., 3 tables, 21 refs., 19 eqs. **DWB**—CHANDRASEKHAR's theory of radiative transfer is applied to the twilight airglow. The theory, which is most applicable to the region of the intensity plateau, is developed for comparison

vith measurements of the absolute brightness, the variation of brightness during twilight, and he intensity ratio D_2/D_1, to obtain the number Na atoms per cm² (column). Numerical esults are presented for a layer scattering solar D line radiation and observed in the zenith or at zenith distance 75°. The effect of diffuse reflection of the D lines by the ground is also evaluated approximately. Some of HUNTEN's observations during winter give absolute brightnesses that are slightly greater then the maximum values predicted by the theory. Means of reconciling this discrepancy are discussed. It is tentatively concluded on the basis of theory-observation comparisons that the abundance of Na varies between 10^9 (summer) and nearly 10^{10} (winter) atoms/cm² (column). It is suggested that the D_2/D_1 ratio may be the most reliable means of determining winter-time values of the abundance. *Subject Headings:* **1. Night airglow 2. Sodium in atmosphere.** (For Pts. 2–3, *see* 8.2–150.)—*Author's abstract.*

8.2–150 551.521.4:546.33

Chamberlain, Joseph W. and Negaard, Beverly J., **Resonance scattering by atmospheric sodium, Pt. 2, Nightglow theory.** *Journal of Atmospheric and Terrestrial Physics*, London, 9(4):169–178, Oct. **1956.** 4 figs., 13 refs., 17 eqs. Also: Hunten, D. M. **Pt. 3, Supplementary considerations.** *Ibid.*, p. 179–183. fig., table, 14 refs., eqs. **DWB**—In Pt. II the theory of radiative transfer is applied to 3 models of a layer of appreciable thickness emitting sodium D lines in the night glow: primary excitation concentrated at the bottom, evenly distributed through the layer, and concentrated at the top. Uncertainty as to the true height of the layer, position of primary excitation and number of Na atoms in a sq. cm. column prevent the useful comparison of theory and observation. The first model is most probable but further lines of investigation are suggested. In Pt. III "Two simple cases of resonant scattering by a line having the Doppler shape are considered. It is shown that an optical depth τ_e for the whole line can be found if the optical depth of the centre τ_o is less than about 1. For different ranges of τ_o the ratios $\tau_o/\tau_e = 2$, 1.5 or 1.6 are useful. Second, the excitation of the sodium emission in the night airglow is discussed. The Chapman mechanism may be quantitively adequate; it leads to a strong concentration of the excitation towards the bottom of the sodium layer." *Subject Headings:* **1. Night airglow 2. Sodium in atmosphere.**—*C.E.P.B. and authors' abstract.*

8.2–151 551.521.4:535.33:546.21

†Gribbon, P. W. F., **Notes on the spectra of oxygen.** *Journal of Atmospheric and Terrestrial Physics*, 9(5/6):326–328, Nov. **1956.** 18 refs., eq. **DWB**—A number of observations of spectra of electrodeless discharges through oxygen are discussed and some preliminary experiments on line width for some OI lines described. *Subject Headings:* **1. Night sky spectrum 2. Oxygen spectra.**—*C.E.P.B.*

8.2–152 535.33:551.521.4:551.590.25

Jones, A. Vallance, **Ca II emission lines in the twilight spectrum.** *Nature*, London, 178(4527):276–277, Aug. 4, **1956.** 2 figs., 5 refs. **DWB**—Spectra at Saskatoon July–Dec. 1955 showed at the end of July and on Aug. 9–10 sharp emission lines at 3933.8 and 3968.4 Å, which are the H and K lines of calcium II. The emission was concentrated between 100 and 120 km. It is suggested that it was due to resonant excitation by sunlight of calcium ions of meteoric origin. *Subject Headings:* **1. Twilight luminescence spectra 2. Meteoric dust.**—*C.E.P.B.*

8.2–153 551.521.6:523.755

Becker, Udo, **Über eine Beziehung zwischen den Filamenten und der Helligkeitsverteilung der Korona in der Eisenlinie λ5303.** [On a relation between the filaments and brightness distribution of the corona in the iron line λ5303.] *Zeitschrift für Astrophysik*, 33(3):147–173, **1953.** 15 figs., 10 tables, 13 refs., 18 eqs. **DLC**—Filaments and corona isophotes are more often either parallel or intersect at right angles than if distribution were chance. This is attributed to symmetry and stability in the system of coronal currents about the filaments. The brightness of monochromatic corona light is discussed as a function of temperature and of electron density. Current system in a filament is analyzed. *Subject Heading:* **1. Corona radiation.**—*C.E.P.B.*

8.2–154 551.521.6:551.507.362

†Friedman, Herbert, **Photoelectric measurements of solar X-rays and ultraviolet.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 59–70. table, 3 figs., 25 refs. **DWB**—Photon counters, sensitive to narrow wave bands, carried on rockets and continuously telemetered to ground, have been used since 1948 to study the solar spectrum near 1460, 1216 and 10–60 Å. Transmission curves near 1215.7 (Lyman Hα) and 1460 Å show the variation in dissociation of O_2 from 30–190 km. The latest solar temperature on 1475 Å is 4050±50°K. Absorption of soft X-rays 10–100 Å emitted from the corona at 10°K accounts for the ionization of the E layer. *Subject Headings:* **1. Rocket observation 2. Ultraviolet spectrum 3. X-ray spectrum.**—*C.E.P.B.*

8.2–155 551.521.6:523.755

Kraul, Walter, **Absolutanschluss der grünen Koronalinie λ=5303 Å an die Sonnenmitte.** [Absolute relation of the green corona line λ=5303 Å in the central sun.] *Zeitschrift für Astrophysik,* 33(3):174–185, **1953.** 9 figs., 2 tables, 9 refs. **DLC**—The total intensity of the green corona line was measured by a photometric method at Wendelstein and compared with that found at other stations. *Subject Heading:* **1. Green corona radiation.**—*C.E.P.B.*

8.2–156 551.521.63:535.33:551.507.362

†Tousey, R., **Observations of the solar ultraviolet spectrum from rockets.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 49–57. table, 32 refs. **DWB**—The spectrographs and their control are described and 13 spectra obtained between Oct. 1946 and Feb. 1954 tabulated. The shortest wave-length recorded by spectrograph is 1754 A, but thermoluminescence extends this to 1040 A. Fraunhofer lines, O_2 and O_3 absorption, Lyman Hα bands and intensity distribution are among the results described. Absorption by components of the earth's atmosphere is discussed. O_2 concentration above maximum was found to decrease exponentially. The heat balance is discussed, the mean diurnal variation being 5.3°C at 48 km, falling to 1°C at 31 and 70 km. *Subject Headings:* **1. Rocket observation 2. Ultraviolet spectrum.**—*C.E.P.B.*

8.2–157 551.521.63:523.77:551.507.362

V—, H. H., **Das Sonnenspektrum im fernen Ultraviolett.** [The solar spectrum in the far ultraviolet.] *Umschau,* 56(20):633, Oct. 15, **1956. DLC**—Note on a solar spectrum down to 1000 Å obtained by rocket 124 km above New Mexico. From a verbal report to the Commission for Solar Radiation at the International Astronomical Union, Dublin Sept. 1955 *Subject Headings:* **1. Solar spectrum 2. Ultraviolet solar radiation 3. Rocket research.**—*C.E.P.B.*

8.2–158 551.521.63:551.57

Volz, F., **Ultraviolett-Absorption, totaler Salzgehalt und wasserlösliche Kohlenwasserstoffe in atmosphärischen Niederschlägen und kondensierten Verbrennungs-Abgasen.** [Ultraviolet absorption, total salt content and soluble carbohydrates in atmospheric precipitation and condensed stack gases.] *Meteorologische Rundschau,* 9(9/10):169–171, Sept./Oct. **1956.** 3 figs., 2 tables, 8 refs. **DWB**—The transparency of water samples was determined in the region 0.22–0.9μ. Rain, melted snow, rime, dew, mostly showed rapid increase of absorption with decreasing wave length below an inflection point around 0.35μ. Data are given, including salt content, of natural and heat-treated samples; the latter generally absorbed less. Absorption curves were similar in water in which combustion gases and smoke particles had been dissolved. Some chemical analyses are given. *Subject Heading:* **1. Ultraviolet absorption by hydrometeors.**—*C.E.P.B.*

8.2–159 551.521.64:523.75

Barton, J. C. and Stockhausen, J. H., **Increase of cosmic-ray intensity in Jamaica due to a solar flare.** *Journal of Atmospheric and Terrestrial Physics,* 9(2/3):161–162, Aug/Sept., **1956.** 2 figs., ref. **DWB**—An increase from about 6000 to 8000 counts per ½-hr was found on

the night of Feb. 22–23, 1956. *Subject Headings:* **1. Cosmic ray variations 2. Solar flare effects 3. Jamaica.**—*C.E.P.B.*

8.2–160 551.521.64:550.38

Elliot, H. and Rothwell, P., **The solar daily variation of the cosmic ray intensity.** *Philosophical Magazine*, Ser. 8, 1(7):669–676, July 1956. 4 figs., 8 refs. **DWB**—Observations were made in London, May 1954 through April 1955, with 2 counter telescopes pointing E and W at 45° to the vertical. The mean solar daily variations corrected for pressure, and their first two harmonics, are plotted. The amplitudes of the 12-hr waves are not statistically significant; that of the 24 hr wave pointing west is about 3 times that pointing east (0.17% *vs* 0.05%). This is not consistent with the view that the solar daily variation is produced by anisotropy of the primary radiation. It is considered that the intensity modulation producing the solar daily variation must take place in the earth's magnetic field. *Subject Headings:* **1. Cosmic ray asymmetry 2. Geomagnetic effects.**—*C.E.P.B.*

8.2–161 551.521.64:550.385

†Ferraro, V. C. A., **Theoretical studies relating to solar corpuscular streams and geomagnetic storms.** *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, 1954. p. 113–119. 31 refs. **DWB**—Recent studies on composition and emission of corpuscular streams, and their association with magnetic storms, are described. The effect of geomagnetic disturbances on the diurnal variation of cosmic ray intensity, though clear, is not yet explained. The Chapman-Ferraro corpuscular theory of magnetic storms, and attempts at its extension, are set out. Peculiarities of magnetic storms at Huancayo, and the atmospheric counterpart of geomagnetic disturbance, are discussed. *Subject Headings:* **1. Corpuscular radiation 2. Magnetic storms.**—*C.E.P.B.*

8.2–162 551.521.64

Fowler, P. H. and Waddington, C. J., **The energy distribution of cosmic ray particles over northern Italy.** *Philosophical Magazine*, Ser. 8, 1(7):637–650, July 1956. 6 figs., 2 tables, 18 refs., 6 eqs. **DWB**—A stack of 80 stripped emulsions (20×15 cm Ilford G5 600μ) was exposed for 5 h 40 m at a mean height of 105,000 ft in 8°E 45°N (geomag. lat. 46°N). The energies of 200 multiply-charged particles were determined. The cut-off energy was 1.55 ±0.06 BeV per nucleon instead of 1.05 predicted by geomagnetic theory. The integral energy spectrum between 1.8 and 3.0 BeV was given by $N(>E)=370/(m_0C^2+E)^{1.50}$, and between 1.55 and 800 BeV, from a consideration of 6α-particle produced jets, to have an exponent of 1.49±0.2. A value for the particle flux at the top of the atmosphere has been found of 93±8α-particle/m²/ster/sec. *Subject Heading:* **1. Cosmic ray intensity.**—*Mainly from authors' abstract.*

8.2–163 551.521.64:537.591.8

Geissler, D., **Streuung an einem Kastenpotential.** [Scattering in a closed potential.] *Annalen der Physik*, 6 Ser., 18(3/4):113–124, **1956.** 14 figs., eqs. Also his: **Zur Theorie der Proton-Proton Streuung bei hohen Energien.** [Theory of proton-proton scattering at high energies.] *Ibid.*, p. 125–145. 12 figs., 36 foot-refs., eqs. **DLC**—The first paper deals with the phase changes in the scattering of 2 interacting particles of equal mass, calculated by the usual and the relativistic Schrödinger equation and shown graphically. The second paper summarizes observations and theory of proton-proton scattering and shows that experiments between 100 and 435 MeV can be satisfactorily described. *Subject Heading:* **1. Cosmic ray showers.**—*C.E.P.B.*

8.2–164 551.521.7:523.75

Gold, T., **High-energy particles in solar flares.** *Nature*, London, 178(4531):487, Sept. 1, **1956. DWB**—Briefly discusses the mechanism by which a small fraction of the particles are accelerated to high energies. It is suggested that when the current density exceeds a certain value, currents become constricted along one or several lines by their own magnetic fields ("pinch" effect). *Subject Headings:* **1. Solar emanations 2. Solar flares.**—*C.E.P.B.*

TEMPERATURE

See also: **Growth and development of raspberry cane** (Williams, Hudson), 8.2–47; **Heat economy of lower air layers** (Knizek, Reuter), 8.2–97; **Ice accumulation on trawlers** (Hay), 8.2–192; **Artic sea smoke** (Coxon), 8.2–220; **Refraction phenomena seen from aircraft** (Durst, Bull), 8.2–297.

8.2–165 551.524:551.584.65(987)

Thompson, H. R. and Bonnlander, B. H., **Temperature measurements at a cirque bergschrund in Baffin Island: some results of W.R.B. Battle's work in 1953.** *Journal of Glaciology*, 2(20):762–769, Oct. **1956.** 2 figs., 12 refs. English and German summaries p. 762. **DWB**—Thermograph records on June 6–July 22, 1953, of snow surface and air 60 cm above, and of air and ice temperature at bottom of schrund 27 m below are plotted, with wind speed. Air temperature outside rose abruptly on June 25. In the schrund temperature rose from −2 to −3°C on June 6–July 2 to fluctuate between −0.5 and +0.5°C with a 3–4 day periodicity (air about 0.5°C higher than ice). This fluctuation is attributed to successive indraughts of cold air following periods of gentle wind, warmed by melt water. Battle died on July 13. *Subject Headings:* **1. Bergschrund temperatures 2. Baffin Island. I. Battle, W. R. B.**—*C.E.P.B.*

8.2–166 551.524.2:551.524.32(410)

Great Britain. Meteorological Office. British Climatology Branch, **Monthly and annual maps of average temperature over Great Britain and Northern Ireland, 1921–50.** Its *Memoranda*, No. 3, **1956.** 1 p. 13 plates. Mimeo. Also: Shellard, H. C., **Maps of standard deviation of monthly mean temperature, 1921–50.** *Ibid.*, *Memoranda*, No. 2, **1956.** 3 p. 6 plates, 2 tables, 2 refs. Mimeo. **GB-MO**—The first memorandum, based on data for 206 stations already published (MO 571), gives average maps of daily maximum, daily minimum, daily range and daily mean temperature (mean max+min)/2, in °F corrected to sea level. For the year as a whole 1921–50 was about ½°F warmer than 1901–30. The second memorandum gives maps of standard deviation of mean temperature for each month, based on 52 stations. It was greater inland than on the coast, greatest in England and least in Ireland. It was smallest in May (0.8–2.0°F) and greatest in Feb. (2.2–4.1°F). *Subject Headings:* **1. Temperature charts 2. Temperature deviations 3. British Isles.**—*C.E.P.B.*

8.2–167 551.524.34(744)

Putnins, P., **The paradox of the "inhomogeneity" of annual temperatures at Blue Hill.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3–4):305–316, **1956.** fig., 3 tables, 5 refs. English, German and French summaries p. 305–306. **DWB**—The variability and trend of annual mean temperatures at Blue Hill, Mass., since 1886–1905 were compared with those of a number of low level stations distant 1¾–187 miles, and the latter were compared among themselves, using several statistical tests. Variability of Blue Hill differs from that of all the other stations, which agree among themselves. Trend at Blue Hill 1905–53 (+0.055°F/yr) is similar to that of Providence, R. I. (0.066/yr) but the details differ; at all other stations it is much smaller. It is concluded that the difference is due to the ideal situation of Blue Hill away from cities. The similarity of the trend to that of Mt. Washington (1940–53) also suggests that Blue Hill is in a layer of strong turbulence. *Subject Headings:* **1. Temperature trends 2. Blue Hill, Mass. 3. New England.**—*C.E.P.B.*

8.2–168 551.524.37(41/2)

Booth, R. E., **A comparison of the winters of 1946–47 and 1954–55.** *Great Britain. Meteorological Office. British Climatology Branch, Memoranda*, No. 4, **1956.** 6 p. 2 plates, 3 tables, 2 refs. Mimeo. **GB-MO**—Both winters were preceded by dull mild stormy weather. The synoptic development is described; northward movement of Siberian anticyclone brought E winds over Britain in Dec. but prolonged wintry conditions did not set in until late Jan. and continued until late March. Temperature and sunshine are tabulated for each district of British Isles, and maps show days of snowfall and duration of snow cover. *Subject Headings:* **1. Severe winters 2. British Isles.**—*C.E.P.B.*

8.2–169 551.524.37:551.584.31

Schnelle, Fritz, **Ein Hilfsmittel zur Feststellung der Höhe von Frostlagen in Mittelgebirgstälern.** [An aid to determining the height of frost situations in Mittelgebirge valleys.] *Meteorologische Rundschau*, 9(9/10):180–182, Sept./Oct. **1956.** fig., 2 tables, 4 refs. **DWB**—In central Odenwald frost zones on valley slopes have long been investigated and charted. Here author examines how narrow a wooded valley must be to hold up the flow of cold air. The width of 20 valleys at the upper limit of the frost zone averaged 444 m (405–488 m) but an error of ±10 m in frost zone makes a large difference in width. Other factors will be investigated later. *Subject Headings:* **1. Frost belts 2. Slope microclimatology 3. Germany.**—*C.E.P.B.*

8.2–170 551.524.7:551.588.1

Faust, Heinrich, **Änderung der thermischen Struktur einer Luftmasse beim Übertritt der Luft vom Nordatlantik auf dem europäischen Kontinent.** [Change of thermal structure of an air mass passing from the North Atlantic to Europe.] *Meteorologische Rundschau*, 9(9/10): 164–168, Sept./Oct. **1956.** 6 figs., 2 refs. **DWB**—The temperature distribution at ground, 850, 700 and 500 mb is plotted for all occasions in Jan. and July 1948–54 when the air moved direct W–E for at least 40° long. The Jan. chart shows the cold air over N. America warmed over the Atlantic and strongly cooled again over Russia; July is nearly the inverse. The mean vertical structure at 5 points in 57°N is shown and the mean 500 mb topography calculated. *Subject Headings:* **1. Temperature profiles 2. Oceanic effects 3. Continental effects.**—*C.E.P.B.*

8.2–171 551.524.7:551.513

Maede, Hans, **Über einige Beziehungen zwischen der Lage des Kältepols und der Zirkulation über Mitteleuropa.** [On some relations between the position of the cold pole and the circulation over Central Europe.] *Zeitschrift für Meteorologie*, 10(7):193–206, July **1956.** 4 figs., 9 tables, 12 refs. **DLC**—The daily positions of the smallest thickness of the 500–1000 mb layer in 110°W–70°E in the Northern Hemisphere in 1949–55 are tabulated for 5 regions by seasons and plotted for mid-winter and mid-summer. Marked seasonal differences of position, intensity and duration appear. The chief winter maximum was in 80–90°W, secondary maximum 60–70°E, in summer the distribution was more uniform. Discussion of the position in relation to the general circulation shows that thermal effects are as important as dynamic. The position of the cold pole is next related to pressure and winds at 500 mb in central Europe, and to the frequency of 7 synoptic types, definite relations being found; these also show seasonal differences. The position of the cold pole may be of value in 5–10 day forecasting. *Subject Headings:* **1. Upper air temperature extremes 2. Cold pole 3. Atmospheric circulation.**—*C.E.P.B.*

SOIL TEMPERATURE

8.2–172 551.525.4:551.311.12

Loewe, F., **Ice movement and temperature distribution in glaciers and ice sheets.** *Journal of Glaciology*, 2(20):772–773, Oct. **1956.** 2 refs. **DWB**—Referring to G. DE Q. ROBIN (*Journal of Glaciology*, 2(18): 523–532, Oct. 1955, *see* 7.4–188, April 1956, *MAB*), LOEWE considers that the small temperature gradients are due not so much to shear and thinning of the ice as to infiltration and refreezing of melt water in crevasses. ROBIN agrees that this may be so. *Subject Heading:* **1. Temperature in glaciers.**—*C.E.P.B.*

8.2–173 551.525.5(71)

Legget, Robert F., **Permafrost research in Northern Canada.** *Nature*, London, 178(4536): 716–717, Oct. 6, **1956.** 2 refs. **DWB**—Description of visit to Mackenzie River and especially Norman Wells, where two new buildings of Northern Research Station were opened for field work on permafrost and building problems in water-bearing silt. *Subject Headings:* **1. Permafrost research 2. Northern Canada.**—*C.E.P.B.*

WATER TEMPERATURE

8.2–174 551.526.6

Houghton, D. M., **The measurement and interpretation of near-surface sea-temperature profiles.** *Royal Meteorological Society, Quarterly Journal*, 82(354):515–517, Oct. **1956.** 2 figs., table, 3 refs., 2 eqs. **DWB**—Observations of sea temperature at frequent intervals 0–10 ft depth from "Weather Observer" (52°50′N, 19°40′W) in summer are described. The heat balance is discussed under items: heat added by radiation, heat removed by turbulent exchange in the air, and change of heat storage. *Subject Heading:* **1. Sea temperature profiles.**—*C.E.P.B.*

PRESSURE AND WIND

PRESSURE

See also: **Barometric changes and firedamp** (Carter, Durst), 8.2–99; **Theory of pressure fields in a baroclinic atmos.** (Haarländer), 8.2–130; **Wind analysis, Irish Sea** (Reynolds), 8.2–186; **Geostrophic wind errors** (Crossley), 8.2–200; **Pressure distribution as a cause of rainy summer 1956** (Bauer), 8.2–228.

8.2–175 551.543:551.509.318

Mugge, R., **Luftdruckgang und Wetter. Die zwei Wettertypen.** [Pressure variation and weather: the two weather types.] *Umschau*, 56(21):656–659, Nov. 1, **1956.** 4 figs. **DLC**—Barograph traces and associated weather are shown and discussed for 1) rapid variations with alternating clear and overcast weather, 2) rapid fall with storm and unsteady fall with thunder, 3) steady high pressure during "Old Wives' Summer." Men's nervous system is sensitive to rapid pressure changes. High pressure has a characteristic structure with waves of 0.1–0.15 mm and period 1–2 hrs due to waves at a temperature inversion at a height of 1–2 km, as well as 12 hr variation. The vertical circulations during bad weather (strong divergence at 6–10 km and strong upper winds) and steady (slight divergence, slow subsidence and weak upper winds) are shown schematically. *Subject Headings:* **1. Pressure fluctuations 2. Weather types.**—*C.E.P.B.*

8.2–176 551.543.2

Schwerdtfeger, Werner and Prohaska, Fritz, **Berichtigung und Ergänzung zur Arbeit "Der Jahresgang des Luftdrucks auf der Erde und seine halbjährige Komponente," diese Z.9,33(1956).** [Correction and completion to "The annual variation of atmospheric pressure on the earth and its half-yearly component", same journal, v. 9:33, 1956.] *Meteorologische Rundschau*, 9(9/10):186–187, Sept./Oct. **1956. DWB**—Attention was called by F. Loewe to an error in the pressure difference Chatham Island-Adélie Land. Temperatures are given for Argentine station in 78°S, 38°26′W. *Subject Heading:* **1. Annual pressure variations.**—*C.E.P.B.*

WIND

See also: **Surveys in mechanics** (Batchelor, Davies), 8.2–1.

8.2–177 551.55:551.501.3

Richter, Johann, **Geschwindigkeitsäquivalente der Windstärkeschätzungen nach Beobachtungen auf deutschen Feuerschiffen.** [Equivalent velocities for the Beaufort estimates of wind forces from observations on German lightships.] *Annalen der Meteorologie*, 7(5/6): 267–287, **1955/56.** 10 figs., 12 tables, 19 refs. **DWB, DLC**—Observations with cup anemometers at 20 m a.s.l. on 5 German lightships are compared with estimates of wind force, and the material studied statistically. The mean velocity (reduced to 10 m) is given for each force (0–12) for each ship, scatter shown in a detailed table and in diagrams. A regression equation gives V (kt at 20 m) $= 2.8 + 2.7\,B + 0.11\,B^2$ (B = Beaufort force). A number of earlier determinations are discussed, both over land and sea, including the International Scale of 1949. Some outstanding questions are raised. *Subject Headings:* **1. Beaufort scale 2. Wind estimation.**—*C.E.P.B.*

8.2–178 551.55:551.588.1

Rodewald, M., **Der Wind über Land und Wasser.** [Wind over land and water.] *Wetterlotse*, Hamburg, No. 107:193–210, Oct. **1956.** 9 figs., 2 tables. **DLC**—Examples are given of the slow increase of wind velocity on land with approach to the German coast, and the rapid increase off shore, with the same pressure gradient. This is compared with the increase and veer of wind with height above land. The effect of friction on the gradient wind and of stable and unstable stratification are explained. The diurnal variation of wind and temperature over land and sea and on the Eiffel Tower are explained. Gustiness is described and illustrated. *Subject Headings:* **1. Wind fields over land and sea 2. Frictional effects.**—*C.E.P.B.*

TURBULENCE

See also: **Plume of hot gas** (Meade, Priestley), 8.2–106; **Eddy energy in turbulent motion** (Dryden), **8.2–120; Sixth O.S.T.I.V. Congress** (Wallington), **8.2–141.**

8.2–179 551.551:533.15

Batchelor, G. K. and Townsend, A. A., **Turbulent diffusion.** (In: Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics.** Cambridge, Eng., Univ. Press, **1956.** p. 352–399. 4 figs., 71 eqs. bibl. p. 398–399.) **DLC**—This paper reviews basic knowledge of turbulent diffusion and sets down essential ideas. Problems in meteorological diffusion are not specifically treated. The major part discusses one-particle analysis and its applications, including decay of homogeneous turbulence, lateral diffusion or shear flow, particle accelerations and pressure gradients. Two-particle analysis and the deformation of material lines and surfaces are briefly discussed. *Subject Heading:* **1. Turbulent diffusion.**—*C.E.P.B.*

8.2–180 551.551:551.554

Ellison, T. H., **Atmospheric turbulence.** (In: Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics.** Cambridge, Eng., Univ. Press, **1956.** p. 400–430. 12 figs., eqs. bibl. p. 426–430.) **DLC**—This summary is limited to turbulent flow of air over the ground, and is mainly empirical. It deals first with the "mean" profiles of wind, temperature and water vapor near the ground, covering austausch, methods of measurement, wind profiles in neutral conditions, the influence of temperature gradient on wind profiles, approach to the geostrophic wind and diffusion of heat and water vapor from the surface. The last section deals briefly with measurements of turbulent fluctuations by mechanical instruments and in somewhat greater detail with hot-wire anemometers. The bibliography of 78 items is a useful selection from the large literature. *Subject Headings:* **1. Atmospheric turbulence 2. Wind profiles.**—*C.E.P.B.*

8.2–181 551.551:551.573:533.607

Hay, J. S., **Evaporation from a saturated rough surface into a turbulent air stream.** *Great Britain. Meteorological Research Committee, M.R.P.*, 973, Jan. 24, 1956. 11 p. 5 figs., 4 tables, 14 refs. Mimeo. **DWB**—Same as *Porton, England. Chemical Research Experimental Establishment, Porton Technical Paper*, No. 533, **1956.** (For abstract, *see* 7.11–216, Nov. 1956, *MAB.*) *Subject Heading:* **1. Evaporation research.**—*C.E.P.B.*

8.2–182 551.551:061.6

Pasquill, F., **Meteorological research at Porton.** *Nature*, London, 177(4521):1148–1150, June 23, **1956. DWB**—Research on atmospheric diffusion which began at Porton in 1921 has been broadened to include larger scale processes, which govern the distribution of airborne particles tens of miles from the source and to great heights. Counts of fluorescent particles with airborne impactors are described; they are being extended. More fundamental research in turbulence has been begun with balloon counts of *Lycopodium* spores. *Subject Headings:* **1. Turbulence research 2. Chemical Defence Experimental Establishment, Porton.**—*C.E.P.B.*

8.2–183 551.551:551.574.1:551.576.11

Saffman, P. G. and Turner, J. S., **On the collision of drops in turbulent clouds.** *Journal of Fluid Mechanics*, London, 1(1):16–30, May **1956.** 2 figs., 18 refs., 10 eqs. **DLC**—The

mechanism of collisions between equal cloud droplets in a turbulent cloud is discussed. Equal drops moving with the air are first considered, and then between n_1 and n_2 drops of radii r_1 and r_2. The collision rate at any time is found to be $N=1.30(r_1+r_2)^3 n_1 n_2(\epsilon/\nu)^{\frac{1}{2}}$ where $(\nu/\epsilon)^{\frac{1}{2}}$ is the time scale of small eddies. This is integrated to show how an initially uniform distribution will change through collisions. "It is concluded that the effects of turbulence in clouds of the layer type should be small, but that moderate amounts of turbulence in cumulus clouds would be effective in broadening the drop size distribution in nearly uniform clouds. . . . In heterogeneous clouds the collision rates are increased, and the effects due to the inertia of the drop soon become predominant." *Subject Headings:* **1. Droplet coagulation 2. Turbulence effects.**—*C.E.P.B., Authors' abstract.*

8.2–184 551.551:551.555.1:551.558.21:551.576

Tucker, G. B., **A trade wind expedition.** *London. Royal College of Science, Scientific Journal*, 24:86–96, **1954.** fig., 3 plates, 5 refs. **DLC**—Describes an Imperial College (London) expedition to Anegada, a low flat island in the Virgin group, organized by P. A. SHEPPARD to study the structure of the trade wind in the sub-cloud layer and the surface drag. Balloon observations at 10 min intervals were made at 2 points on the N.E. coast $2\frac{1}{2}$ km apart, and continuous records of pressure, temperature, humidity and wind were obtained at 3 sites (one on lee side). There was a program of time-lapse cloud photography. The results of the expedition are still being worked up. *Subject Headings:* **1. Trade wind variations 2. Anegada, Virgin Islands.**—*C.E.P.B.*

8.2–185 551.551:629.13

Turbulence caused by large aircraft. *Commonwealth Air Transport Council, Newsletter*, 37:30–31, Oct. **1955. DLC**—A note on danger from trailing vortices behind each wing of large aircraft, which may cause severe turbulence 8000 ft behind the aircraft is followed by precautions to be taken by pilots landing or taking off. *Subject Heading:* **1. Turbulence due to aircraft.**—*C.E.P.B.*

HORIZONTAL WIND DISTRIBUTION AND WIND VARIATION

See also: **Structure of atmos. surface layer** (Lettau, Businger), 8.2–121; **Atmos. turbulence** (Ellison), 8.2–180.

8.2–186 551.552(41/2):551.542.1

*Reynolds, G., **A wind analysis for the northern Irish Sea.** *Royal Meteorological Society, Quarterly Journal*, 82(254):469–480, Oct. **1956.** 12 figs., 8 tables, 9 refs., 8 eqs. **DWB**—Anemometer data for Holyhead, Pt. of Ayre, Liverpool, Southport and Fleetwood are analyzed for highest hourly wind speed and maximum gust, and formulas developed for maximum hourly speeds in given periods. The distribution of wind speeds between given limits, and frequency of gales, and their annual variation are next taken up. Relations between geostrophic, gradient and surface wind direction and speed are analyzed; the correlation between geostrophic and surface wind (10-min means) when the latter exceeded 40 kt is +0.55 for direction and +0.52 for speed. *Subject Headings:* **1. Wind data 2. Irish Sea.**—*C.E.P.B.*

8.2–187 551.553.1(422)

Moffitt, B. J., **Nocturnal wind at Thorney Island.** *Meteorological Magazine*, London, 85(1011):268–271, Sept. **1956.** 4 figs. **DWB**—Thorney Island lies in a shallow land-locked harbor on the south coast of England, backed by hills. Anemograms are given showing a nocturnal wind from NNE, which is a combined katabatic and land breeze. It delays or dissipates fog. A graph relates occurrence to gradient wind and temperature fall. *Subject Headings:* **1. Offshore winds 2. Thorney Island, Eng.**—*C.E.P.B.*

8.2–188 551.553.8:551.515.1(42)

§Houghton, D. M., **The gale of July 29, 1956.** *Meteorological Magazine*, London, 85(1012): 289–293, Oct. **1956.** 4 figs. **DWB**—A depression of exceptional intensity for July crossed Eng. from Scilly to the Wash; pressure in center fell to 974 mb, a record for July. There were numerous wrecks, 6 deaths from falling trees, flooding, landslides and great damage to crops

and fruit. It originated as a small frontal wave from a weak depression over eastern America. Synoptic charts and 100–500 mb thickness lines are shown and synoptic developments described. *Subject Headings:* **1. Gales 2. Depressions 3. England.**—*C.E.P.B.*

8.2–189 551.553.8(261):639.2

Mertins, H. O., **Übersicht über die Sturmhäufigkeit auf den Island- und Norwegenfangplätzen im Jahre 1955.** [Storm frequency on the Iceland and Norwegian fisheries in 1955.] *Wetterlotse*, Hamburg, No. 102/103:136–137, July **1956.** 2 tables. **DLC**—Tables show the number of hours of wind force 8 and above in each month for 9 regions, and for the 5 Iceland fisheries departures from the average 1950–54. *Subject Headings:* **1. Gale frequency data 2. Iceland 3. Norwegian Seas.**—*C.E.P.B.*

SPECIAL WINDS

See also: **Trade wind expedition** (Tucker), 8.2–184; **Winds, new harbor of Würzburg** (Horney), 8.2–287.

8.2–190 551.555:656.08:656.61(267.5)

Rodewald, M., **Der Totalverlust des Hamburger Dampfers "Maria Schröder" im Golf von Akaba (April 1956) und seine Ursachen.** [The total loss of the Hamburg steamer "Maria Schröder" in the Gulf of Aqaba and its causes.] *Wetterlotse*, Hamburg, No. 102/103:126–135, July **1956.** 3 figs. **DLC**—The "Maria Schroder" was lost on the east coast of Sinai on the night of 10–11 April through storm and bad visibility. The ship was waiting till daylight to pass the narrow Tiran Strait. The shores are steep and act as a funnel for the wind. On the 10th it rose to NNE force 10 with a dust storm on a cold front. At 0035 h the ship, which had no radar, drifted on to the reefs. A high pressure area lay over the Levant and the wind at Aqaba was N 2, but there seems to have been local low pressure over the Gulf. *Subject Headings:* **1. Shipwrecks 2. Local winds 3. Aqaba Gulf, Red Sea.**—*C.E.P.B.*

WIND EFFECTS

8.2–191 551.556:551.46:532.59

Darbyshire, J., **An investigation into the generation of waves when the fetch of the wind is less than 100 miles.** *Royal Meteorological Society, Quarterly Journal*, 82(354):461–468, Oct. **1956.** 6 figs., 12 refs., 4 eqs. **DWB**—Wave measurements on Lough Neagh with a portable recorder and over the Irish Sea with an airborne recorder are plotted. Linear relations are found between maximum wave height and (wind speed)^2, wave period and (wind speed)$^{\frac{1}{2}}$. Ratio of wave characteristics against fetch to those with large fetch for the same wind speed is also plotted. Satisfactory empirical formulas are deduced for wave height, period and spectrum; for large fetch these reduce to those already found over the open sea. *Subject Heading:* **1. Wind-wave relationships.**—*C.E.P.B.*

8.2–192 551.556:551.524.37:656.1

Hay, R. F. M., **Ice accumulation upon trawlers in northern waters.** *Meteorological Magazine*, London, 85(1010):225–229, Aug. **1956.** table, 5 refs. **DWB**—Discussing capsizing of "Lorella" and "Roderigo" through weight of ice on superstructure on Jan. 26, 1955, in an E–NE gale force 8–11, possible causes are considered. The freezing of supercooled droplets, including frost smoke, could have given only 0.022 tons/hr of ice. Maximum weight of snow on ships 0.19 tons/hr, freezing of sea spray >2 tons/hr. Accumulation of ice occurred in a little over 24 hrs, giving a total of 50 tons or more. This would be enough to capsize the ships. *Subject Headings:* **1. Shipwrecks 2. Ice accumulation on ships.**—*C.E.P.B.*

8.2–193 551.556:551.465

Hughes, P., **A determination of the relation between wind and sea-surface drift.** *Royal Meteorological Society, Quarterly Journal*, 82(354):494–502, Oct. **1956.** 2 figs., 4 tables, 14 refs., 5 eqs. **DWB**—A number of cards in plastic envelopes, arranged to float in about 1 cm water, were released from aircraft over the eastern N. Atlantic in 1954. Their drift is compared with 10-day mean gradient winds. Taking surface water speed u_s cm/s as related to gradient wind W m/s by $u_s = kW$, and the angle between them as θ (+to right), mean k was

2.2, s.d. 0.392, mean $\theta - 0.3$, s.d. 8.6. Sources of error are discussed. Results are compared with other determinations. *Subject Headings:* **1. Wind driven currents 2. North Atlantic.** —*C.E.P.B.*

8.2–194 532.59:551.46:551.556

Roll, H. U. and Fischer, G., **Eine kritische Bemerkung zum Neumann-Spektrum des Seeganges.** [A critical note on Neumann's sea spectrum.] *Deutsche Hydrographische Zeitschrift*, 9(1):9–14, **1956.** 6 refs., 25 eqs., German, English and French summaries p. 9. Also: Walden, Hans, **Vorschlag zur Änderung der Neumannschen Konstanten C bei der Berechnung der Wellenhöhe aus der Windstärke.** [Proposal to alter Neumann's constant *C* when calculating wave height from windforce.] *Ibid.*, p. 14–18. 2 figs., 7 refs., 6 eqs. German, English and French summaries p. 14. **DWB**—Both papers discuss the equations of the energy spectrum of sea waves. NEUMANN's equations give different maxima according as the spectrum is referred to the period or the frequency; this is avoided by adopting a logarithmic scale. An equation is set up for the total energy per unit of sea surface, in which the 4th power of wind speed enters. NEUMANN's constant *C* in the expression for mean wave energy is too high. *Subject Heading:* **1. Ocean wave spectra. I. Neumann, G.**—*C.E.P.B.*

8.2–195 551.556:551.465:532.59

†Ursell, F., **Wave generation by wind.** (In: Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics.** Cambridge, Eng., Univ. Press, **1956.** p. 215–249. 5 figs., 2 tables, eqs., bibl. p. 247–249.) **DLC**—This summary deals mainly with the physics of waves in deep water. The conditions of initial instability (Kelvin-Helmholtz and boundary) are set out, followed by semi-empirical theories of wave generation, systems of wave forecasting and the spectrum of sea waves. Sec. 3 covers experimental studies and observations, both in the laboratory and at sea. The critical minimum value of a wave-raising wind appears to depend on wind structure, varying from 40 to 1200 cm/sec (theory 650 cm/sec). Finally, the "roughness of the sea," surface slope and drag are considered. "The present state of our knowledge is profoundly unsatisfactory" but some general conclusions emerge. *Subject Heading:* **1. Wind waves.**—*C.E.P.B.*

8.2–196 551.556.3:621.311.24

Abraham, E. Mitford, **Windmills.** *Agriculture*, London, 63(3):130–133, June **1956.** 4 figs. **DA**—A brief history of windmills in Eng. is given. They were used for grinding wheat and oats and for fen drainage. A few post mills and some tower mills are still working. *Subject Heading:* **1. Windmills.**—*C.E.P.B.*

8.2–197 551.556.3:797.14

Davidson, K. S. M., **The mechanics of sailing ships and yachts.** (In: Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics.** Cambridge, Eng., Univ. Press, **1956.** p. 431–475. 20 figs., 3 tables, 17 refs.) **DLC**—The factors of the remarkable speed increase of modern yachts, due largely to their ability to sail close to the wind, are discussed in the light of modern aero- and hydrodynamics. Speed has nearly doubled since 1492 with the change from square-rigged ships to fore-and-aft rigged yachts. The maximum speed is now about $1.15\sqrt{}$(overall length ft). In Pt. 3 the sailing of light-displacement craft, hydrofoil supported and kite-driven craft is discussed. It is considered that a speed of 40 kn or more in a 12 kn wind is possible. *Subject Headings:* **1. Wind utilization 2. Sailing ships.**—*C.E.P.B.*

UPPER AIR WINDS

See also: **Upper wind evaluation apparatus** (Fett), 8.2–61; **Geostrophic wind scale** (Matthews), 8.2–63; **Wind measurements** (Reisig), 8.2–64; **Upper air data** (Goldie), 8.2–110; **Low level jet stream** (Arakawa), 8.2–127; **Strong winds at high levels** (Emery), 8.2–128; **Jet stream navigation** (Heines), 8.2–129.

8.2–198 551.557:551.510.53

†Bannon, J. K. and Jones, R. A., **Average wind at 60 mb.** *Meteorological Magazine*, London, 85(1009):194–200, July **1956.** 4 figs., 37 refs. **DWB**—A shortened version of: **The**

mean wind at 60 mb. *Great Britain. Meteorological Research Committee, M.R.P.*, 925, 24 Aug. 1955. (*See* 7.5–191, May 1956, *MAB.*) *Subject Heading:* **1. Stratospheric winds.** —*C.E.P.B.*

8.2–199 551.557:551.510.535

Clark, Clayton and Peterson, Allen M., **Motion of sporadic-E patches determined from high-frequency backscatter records.** *Nature*, London, 178(4531):486–487, Sept. 1, 1956. 2 figs., 10 refs. **DWB**—Reflection of backscatter from ground or sea by sporadic-E patches has been measured at Stanford, Cal. Mean duration of patches 3 hr, mean speed 300 km/hr with peak at 250 km/hr and a few values exceeding 550. The direction was predominantly towards west. *Subject Heading:* **1. Ionospheric drift.**—*C.E.P.B.*

8.2–200 551.557:551.542.1:519.25

Crossley, A. F., **Errors in the estimation of geostrophic winds.** *Meteorological Magazine*, London, 85(1012):311–313, Oct. 1956. table, 3 refs., 10 eqs. **DWB**—The theory of errors in computing geostrophic winds is set out. Measurements of geostrophic winds were made at 4 points over Eng. and the North Sea and the root-mean-square error was found to be 5 kt for an average speed of 39 kt. An estimate by R. MURRAY by a different method was 6 kt. *Subject Heading:* **1. Geostrophic wind errors.**—*C.E.P.B.*

8.2–201 551.557:551.510.535:551.501.8

Putter, P. St. and Court, G. W. G., **Remarks on a paper by G. W. G. Court: "Ionospheric wind determination from spaced radio-receiver fading records."** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):163–164, Aug./Sept. 1956. 4 refs. **DWB**—PUTTER points out that COURT's method (*Ibid.*, 7(6):333, Dec. 1955; *see* 7.4–216, April 1956, *MAB*) was previously published by him. COURT comments. *Subject Heading:* **1. Ionospheric wind measurement.** —*C.E.P.B.*

8.2–202 551.557:551.43(44)

Rogers, P. and Keller-Hammer, J., **An orographically generated jet stream?** *Meteorological Magazine*, London, 85(1011):277–278, Sept. 1956. fig. **DWB**—Condensation trail Sept. 30, 1954, above Haute Savoie showed spectacular lateral distortion, attributed to high level turbulence caused by Mount Sion (750 m). *Subject Headings:* **1. Orographic turbulence 2. France.**—*C.E.P.B.*

VERTICAL MOTION

See also: **Plume of hot gas** (Meade, Priestley), 8.2–106; **Sixth O.S.T.I.V. Congress** (Wallington), 8.2–141; **Trade wind expedition** (Tucker), 8.2–184.

8.2–203 551.558.21:532.59

Scorer, R. S. and Wilkinson, Mary, **Waves in the lee of an isolated hill.** *Royal Meteorological Society, Quarterly Journal*, 82(354):419–427, Oct. 1956. 10 figs., 3 refs., 18 eqs. **DWB**—A two-dimensional ridge produces a system of lee waves parallel to it, in a suitable airstream. Synthesizing an isolated hill by superposition of ridges inclined at various angles but intersecting in a point, and representing this by an integral, the interference pattern of the lee-wave systems of the component ridges has been computed. An isolated hill produces a lee-wave pattern very similar to that produced by a ship moving across the surface of deep water. It is confined within a wedge-shaped region, the corner of the wedge being vertical and through the hill top. The half-angle of the wedge depends upon the airstream characteristics but is typically about 15°. The waves decrease in amplitude downstream like $x^{-\frac{1}{2}}$. If an oval hill lies across the airstream an appreciable lee-wave system will be produced but it is greatly reduced in amplitude if the major axis of the hill is turned through 30° or more from the normal to the airstream. The discussion is restricted, on account of its complexity, to airstreams composed of only two layers, in each of which the parameter l is independent of height. *Subject Heading:* **1. Lee waves.**—*Authors' abstract.*

8.2–204 551.558.21:551.43

Sheppard, P. A., **Airflow over mountains.** *Royal Meteorological Society, Quarterly Journal*, 82(354):528–529, Oct. **1956.** table, eqs. **DWB**—Discusses briefly and mathematically the conditions under which air can rise over mountains instead of going round them. Values of zero height velocity which would enable air just to surmount heights of 250–1500 m for given lapse-rates are computed, omitting the equation of continuity; they are not extreme. *Subject Heading:* **1. Air flow over mountains.**—*C.E.P.B.*

AQUEOUS VAPOR, HYDROMETEORS AND HYDROMETEOROLOGY

See: **Ultraviolet absorption in atmos. precip.** (Volz), 8.2–158.

HUMIDITY

See also: **Weather and health** (Spence), 8.2–57.

8.2–205 551.571:621.123.5

Matheson, J. C., **Dew point and cargo ventilation.** *Marine Observer*, 26(174):220–223, Oct. **1956. DLC**—Account of methods of avoiding damage to cargo through condensation and sweating. Methods of taking temperature in hold and dew point on deck are described; these should be compared at least once a day. If hold temperature is above deck dew point, ventilate; if below, do not ventilate. Examples are given. *Subject Headings:* **1. Cargo protection 2. Cargo ventilation.**—*C.E.P.B.*

8.2–206 551.571.35(42)

Smith, L. P., **Duration of high relative humidities.** *Meteorological Magazine*, London, 85(1010):229–232, Aug. **1956.** fig., table, ref. **DWB**—Mean durations of relative humidity $\geq 90\%$ are computed for each month June through Sept. and each year 1950–54, for a number of stations in Eng. Seasonal totals are mapped; they vary from 462 in North Cheshire to >1250 on high ground and Cornish coast, reaching 1281 at Plymouth and 1336 at Boscombe Down. Totals vary greatly in short distances. *Subject Headings:* **1. Relative humidity variations 2. England.**—*C.E.P.B.*

8.2–207 551.571.36(411)

Green, F. H. W., **Another remarkable low humidity.** *Weather*, 11(9):300–301, Sept. **1956. DWB**—On June 10, 1956, 8% was recorded by hygrograph at Achnagoichan in the Cairngorms, Scotland. Temperature and humidity changed from 38°F, 97% at 3–4 h to 67°F and 8% at 1120 G.M.T.; temperature continued to rise to 75°F at 1600 but humidity rose again. Next day there was a local thunderstorm with heavy rain. *Subject Headings:* **1. Humidity extremes 2. Cairngorms, Scotland.**—*C.E.P.B.*

8.2–208 551.571.36(261)

Low relative humidity over the Atlantic. *Marine Observer*, 26(174):212–213, Oct. **1956.** fig. **DLC**—O.W.S. "Weather Explorer" on May 18, 1955, in 57°42′N, 15°6′W, recorded dry bulb 47°F, dew point 28°F, relative humidity 47%. The ship was in a ridge of high pressure (chart given). *Subject Headings:* **1. Humidity extremes 2. North Atlantic.**—*C.E.P.B.*

8.2–209 551.571.7:551.593.54:662.2:539.1

Mackenzie, J. K., **Unusual frost points and dust haze in the stratosphere on March 9 and 10, 1955.** *Meteorological Magazine*, London, 85(1010):233–237, Aug. **1956.** 2 figs., 2 tables, 2 refs. **DWB**—In 1954 mean frost point at 45,000–50,000 ft over S. England (35 ascents) was −116°F, and only above −105°F once (Aug. 5, −89 to −99°F). On March 9, 1955, it was −89 to −91°F, falling to normal by March 11. Very thin haze was present above 32,000 ft on March 9. Haze and excess water vapor may have been due to the atomic explosion in Nevada on March 2. *Subject Headings:* **1. Upper air humidity 2. Haze layers aloft 3. Atomic explosions 4. England.**—*C.E.P.B.*

EVAPORATION AND EVAPOTRANSPIRATION

See also: **Desiccation and dormancy of barley** (Wellington), 8.2–46; **Water balance and general circulation** (Sutcliffe), 8.2–124; **Evaporation from saturated rough surface** (Hay), 8.2–181.

8.2–210 551.573:551.579.5:634

Goode, J. E., **Soil moisture deficits developed under long and short grass.** *East Malling, England. Research Station, Annual Report,* 1955:64–68, pub. **1956.** 3 figs., table, 5 refs. Also his: **Soil moisture deficits under swards of different grass species in an orchard.** *Ibid.*, p. 69–72. 2 figs., 2 refs. **DLC**—Grass on one plot was cut 13 times in 6 months, the cuttings being allowed to lie. On the other plot it was uncut and grew to 24″ by mid-July, when it formed a hay mulch. Soil moisture to 3 ft was measured at intervals. The deficit under long grass was greater than under short growth, by up to 1.6″ at end of June, decreasing to ½″ in Oct. Nearly all the difference was between 1½ and 3 ft. It was due to greater transpiration of long grass. Hence competition between trees and grass in an orchard is reduced by frequent mowing. In the second paper depth of soil drying is found to be greatest with perennial rye grass, least with annual meadow grass, and intermediate with timothy. *Subject Headings:* **1. Soil moisture variations 2. Orchards 3. England.**—*C.E.P.B.*

8.2–211 551.573:551.579.5:631.4

Penman, H. L., **The movement and availability of soil water.** *Soils and Fertilizers,* Farnham Royal, 19(3):221–225, June **1956.** 2 tables, 6 refs. **DLC**—Distinguishes between potential (properties at a point) and quantity (properties associated with a volume) of soil water. Flux = potential gradient × conductivity but there is no general mathematical theory of soil-water movement. Availability for transpiration is the ratio of actual to potential transpiration rate, available water is the difference between field capacity and permanent wilting point. The experiments of F. J. VEIHMEYER and C. H. M. VAN BABEL on availability and PENMAN on soil moisture deficit are summarized. *Subject Heading:* **1. Soil moisture availability.**—*C.E.P.B.*

8.2–212 551.573:631.67

Rider, N. E., **Water loss from various cropped surfaces.** *Great Britain. Meteorological Research Committee, M.R.P.,* 972, April 20, **1956.** 9 p. 5 figs., 3 tables, 10 refs., eqs. Mimeo. **DWB**—Potential evapotranspiration was calculated by PENMAN's aerodynamic method for fields of bare soil, pasture, peas and brussel sprouts near Cambridge, Eng. Apparatus is described and set-up illustrated; observation heights were 25 cm apart. Calculated water loss from peas and sprouts averaged nearly 10 times that from grass; that from soil was still less. The ratios varied from day to day but the differences are real. *Subject Headings:* **1. Potential evapotranspiration 2. Irrigation needs.**—*C.E.P.B.*

8.2–213 551.573:551.577.3:551.579.5

Royal Astronomical Society, **World circulation and exchange of water (discussion).** *Observatory,* London, 76(891):54–61, April **1956.** **DLC**—The discussion was opened by MRS. M. MORGAN with a summary of the factors in the hydrologic cycle, including water storage in oceans (97%), ground (2%) and snow or glaciers (1%). W. H. MUNK gave an account of the seasonal range of sea level as a function of latitude, including the effect of temperature, which causes "isostatic" changes. The annual world change from Oct.–March is estimated as about −4 cm but this figure is doubtful. D. W. PRIVETT discussed the water balance over the oceans, and gave a revised estimate of $k = 4.8 \times 10^{-6}$ in the expression $E = k(e_s - e_a)w$. He described the geographical and seasonal variations of evaporation, evaporation-precipitation, and net transport of water across latitude circles. R. C. SUTCLIFFE summarized the circulation of water in the atmosphere, and suggested that estimates of the balance be made over all continents where aerological data were adequate. *Subject Heading:* **1. Hydrologic cycle.** —*C.E.P.B.*

CONDENSATION

See also: **Acidity and salinity of rain** (Gorham), 8.2–104; **Drop collision in turbulent clouds** (Saffman), Turner), 8.2–183; **Showers resulting from coalescence** (Feteris, Mason), 8.2–224; **Fog precip.** (Nagel), 8.2–237.

8.2–214 551.574.1:551.574.7:629.13

Bigg, F. J., **The atomisation of water by air blast nozzles for the simulation of cloud conditions for icing research.** *Farnborough, England. Royal Aircraft Establishment, Technical Note*, No. Mech. Eng. 203, June **1955.** 16 p. 10 figs., 3 tables, 10 refs. Mimeo. **GB-MO**—In connection with icing tests experiments were made in wind tunnels. Air blast nozzles were the only type found to produce a spray of droplets simulating natural cloud. The volume median diameter was $10+1.5\ W/PA\mu$, where W is water flow (gallons/hr), P the applied pressure (lb/in^2) and A the area of the air annulus (in^2). At sonic air velocities the diameter approaches 10μ. Droplets cool very rapidly in an ambient air stream and preheating is required for them to reach the test specimens as supercooled droplets. Full details are given. *Subject Heading:* **1. Icing of aircraft experiments.**—*C.E.P.B.*

8.2–215 551.574.1:551.576.11:551.578.41

Ludlam, F. H., **The forms of ice clouds, Pt. 2.** *Royal Meteorological Society, Quarterly Journal*, 82(353):257–265, July **1956.** 2 figs., 3 tables, 11 refs., 3 eqs. **Discussion.** *Ibid.*, 83(355):127–129, Jan. **1957. DWB**—Flocciform (shred) clouds often occur a few hundred meters above well developed cirrus fallstreaks; examples are shown. They are due to the release of latent heat in fallstreaks, causing convective bubbles to rise at a limiting speed of 1–2 m/s. At temperatures of −12 to −40°C these produce new clouds, originally as droplets about 24μ diameter. In very steep lapse rates altocumulus castellatus is formed. Observations of fallstreaks, shred clouds and cumuliform clouds at Dunstable and Östersund are tabulated. (For Pt. 1, *see* C–151, March 1950, *MAB.*) *Subject Headings:* **1. Cirrus clouds 2. Flocciform clouds.**—*C.E.P.B.*

8.2–216 551.574.1:551.506.7

Murgatroyd, R. J. and Garrod, M. P., **The measurements of natural freezing nuclei made by the Meteorological Research Flight during Janaury, 1956.** *Great Britain. Meteorological Research Committee, M.R.P.*, 998, Aug. 23, **1956.** 20 p. 12 figs., 4 tables, 11 refs. Mimeo. **DWB**—Counts of natural freezing nuclei in a cold chamber carried by airplane are described, including instrumentation and limitations. Counts were made on 25 days in Jan. 1956 up to 10,000 ft over S. England; numbers as observed and at −20° and −25°C are tabulated, and plotted against temperature, frost point and cloud. Day-to-day variations were not significant and gave no support to BOWEN's meteor hypothesis; on the other hand horizontal variations were large. Concentrations of +1/liter were not usual until temperature fell to −20°C or below. Results of other workers are compared. Concentrations were low when vertical stability was low, suggesting that in contrast to condensation nuclei, freezing nuclei are not due to transport upwards from the ground. There was no correlation with air mass or wind direction. *Subject Headings:* **1. Freezing nuclei 2. Airplane observations.** —*C.E.P.B.*

8.2–217 551.574.2:629.135

Sarson, P. B., **Aircraft condensation aura.** *Meteorological Magazine*, London, 85(1009): 217–218, July **1956.** photo, 3 refs. **DWB**—Photo shows a Canberra aircraft near Accra, Gold Coast, at 10.30 GMT, enveloped in an aura of self-made cloud lasting 1–2 sec. It occurred several times and was due to adiabatic cooling by a pressure fall (calculated as 68 mb) on the wing. The sea breeze, beginning to break through in patches, was moist enough to condense 1½ gm of water droplets per cu. m. of air. *Subject Headings:* **1. Cloud condensation on aircraft 2. Accra, Gold Coast.**—*C.E.P.B.*

8.2–218 551.574.41

Drimmel, Julius, **Zur Physik der Taubildung an der Erdoberfläche.** [On the physics of dew formation on the earth's surface.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):343–356, **1956.** 4 figs., 4 tables, 11 refs., 10 eqs. German, English and

French summaries p. 343–344. **DWB**—The amount of dew on a surface covered with vegetation or on a drosometer is calculated as a function of effective outward radiation, turbulent exchange, absolute humidity and the cooling characteristics of the ground, and a complex equation (10a) is derived. Calculated and observed amounts of dew agreed well, calculated exceeding observed by at most 12%. *Subject Heading:* **1. Dew formation.**—*C.E.P.B.*

8.2–219 551.574.7:629.13:551.515.8

Best, A. C., **Ice accretion on aircraft in warm-front conditions.** *Meteorological Magazine*, London, 85(1011):257–263, Sept. **1956.** table, 9 refs., 9 eqs. **DWB**—Equations are given for rate of release of water vapor in ascending air, rate of deposition on ice particles, and conditions for maintaining water saturation. The initial minimum updraught to maintain liquid water, and therefore risk of icing, at 263–243°A is 1.4–1.9 cm/sec. When rate of rainfall becomes high, the minimum is 4 cm/sec. These are conditions which may occur locally in warm fronts. An appendix shows that the rate of deposition on a nonspherical ice crystal (plate or needle) is similar to that on a spherical crystal of the same surface area. *Subject Headings:* **1. Icing of aircraft 2. Warm fronts.**—*C.E.P.B.*

FOG AND CLOUD

See also: **Cloud amount and sunshine** (Tribble), 8.2 62; **Radar and synoptic studies of precip. clouds** (Ludlam, Mason), 8.2–65; **Condensation trails** (Briggs), 8.2–98; **Exhaust trail** (Jones), 8.2–100; **1952 fog, London** (Smithard), 8.2–108; **London fog** (Waller, Lawther), 8.2–109; **Drop collision in turbulent clouds** (Saffman, Turner), 8.2–183; **Trade wind expedition** (Tucker), 8.2–184; **Ice cloud forms** (Ludlam), 8.2–215.

8.2–220 551.575.1:551.524.37(261.2)

Coxon, A., **Arctic sea smoke.** *Weather*, 11(10):318, Oct. **1956.** photo. **DWB**—Photograph of frost smoke off Portland Is., Dorset, air temperature 22°F, sea 47°F, wind NE 3–4. *Subject Headings:* **1. Frost smoke 2. English Channel.**—*C.E.P.B.*

8.2–221 551.576.11

Scorer, R. S., **The man who dissolved clouds.** *Weather*, 11(10):319–322, Oct. **1956.** fig. **DWB**—An amusing article about a crank who claimed to dissolve clouds by staring at them, but failed in a test. It is illustrated by 11 photos of small fair weather cumulus at 1½ min intervals. *Subject Heading:* **1. Cloud dissolution.**—*C.E.P.B.*

8.2–222 551.576.11:629.13

Tribble, D. T., **Distrails.** *Meteorological Magazine*, London, 85(1010):249, Aug. **1956.** 2 photos., ref. **DWB**—Photos of a distrail in a layer of CiCu, 20–25,000 ft, over N.W. London on May 24, 1956. It lasted 15–20 min. One shows ice-crystal trails. *Subject Heading:* **1. Negative condensation trails.**—*C.E.P.B.*

PRECIPITATION

See also: **Rainfall and potato yield** (McDermott, Ivins), 8.2–45; **Agricultural regions of Victoria** (Wilson), 8.2–48; **Radar and synoptic studies of precip. clouds** (Ludlam, Mason), 8.2–65; **Radar weather observations** (Schulze), 8.2–66; **Rainfall measurements** (Watkins), 8.2–68; **Water balance and general circulation** (Sutcliffe), 8.2–124; **World circulation and exchange of water,** 8.2–213; **Fog precip.** (Nagel), 8.2–237; **Recent developments in hydraulics,** 8.2–249; **Two minima of average rainfall, Far East** (Arakawa), 8.2–263.

8.2–223 551.577.1:621.396.8

Croney, J., **Clutter on radar displays: reduction by use of logarithmic receivers.** *Wireless Engineer*, London, 33(4):83–96, April **1956.** 24 figs., 3 refs., 22 eqs. **DLC**—Theory of the logarithmic receiver is set out. Its use will reduce sea clutter and especially rain clutter; for rain differentiation should follow. Details and illustrations are given. *Subject Headings:* **1. Radar echoes from rain 2. Radar echoes from sea.**—*C.E.P.B.*

8.2–224 551.577.11:551.574.1:551.501.81

Feteris, P. J. and Mason, B. J., **Radar observations of showers suggesting a coalescence mechanism.** *Royal Meteorological Society, Quarterly Journal*, 82(354):446–451, Oct. **1956.** fig., 2 tables, 7 refs. **DWB**—Cumulus clouds analyzed by radar in London (3 cm) and Dunstable (10 cm) on 13 days in summer 1955 gave echoes originating below the −2°C level and 200–2000 m deep. The echo tops ascended at 1–5 m/s. Details are tabulated. They were often associated with mixed Cu and StCu, and exceeded −8°C level only once. In no case was a melting zone found. It is inferred that precipitation was initiated by coalescence and not by ice crystals. *Subject Headings:* **1. Radar precipitation echoes 2. Coalescence theory.** —*C.E.P.B.*

8.2–225 551.577.21(422.5):551.491

Thomson, D. Halton, **A further 20-years' record of rainfall and water-levels in the chalk at Chilgrove, West Sussex.** *Institution of Water Engineers, London, Journal*, 10(3):193-201, May **1956.** 2 figs., 5 tables, 4 refs. **DLC, DWB**—A record for 1836–1935 (Its *Transactions*, 43:154, 1938) is extended to 1955. Monthly values are given of rainfall and well water levels. Annual variation (maximum level Feb., minimum Sept.) and exceptional droughts are tabulated. A photo of Thomson faces p. 187. *Subject Headings:* **1. Water level data 2. Rainfall 3. Chilgrove, Eng.**—*C.E.P.B.*

8.2–226 551.577.22(436)

*Steinhauser, Ferdinand, **Über die Struktur der Niederschlagstage in Österreich. Zahl und Folgen von Niederschlagsstunden.** [On the structure of rainfall days in Austria: number and sequence of rainfall hours.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):466–476, **1956.** 3 figs., 3 tables, 2 refs. German, English and French summaries p. 466–467. **DWB**—To determine the characteristics of raindays (≥ 0.1 mm) in Austria, numbers of rainfall *hours* for 28 stations for May through Sept. 1946–55 were compared with numbers of raindays and amount of rainfall. Mean number of hours per rainday varies from 4–9, but total hours increases by 14 for increase of 1 rainday. Duration of rainfall is 7–20% of the time. Austria is divided into 7 regions according to percent probability that rain will occur on more than n hours in a day ($n=1$–20), and mean coefficients given for $y=a+be^x$ ($y=\%$ time for x hrs), and into 4 regions according to probability that continuous rain will last for more than 1–12 hrs ($y=c_1e^{k_1x}+c_2e^{k_2x}$). *Subject Headings:* **1. Raindays 2. Rainfall duration 3. Austria.**—*C.E.P.B.*

8.2–227 551.577.22:551.577.51(436)

Trischler, F., **Untersuchung über räumlich kohärente und singuläre Tagesniederschläge.** [Investigation of spatially coherent and singular daily rains.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):370–405, **1956.** 6 figs., 27 tables, 9 refs. German, English and French summaries p. 370–371. **DWB**—A "coherent" day is one with precipitation at all stations in an area (broad rains, B); other days are singular (point rains, P). These are examined for 1924–33 at 36 stations in 12 districts in eastern Austria, divided into 4 quadrants. The mean numbers of B days and P days are given and differences between districts analyzed. B days account for 85% of the precipitation. Data for 4 quadrants, W. and E. halves, and whole area are next taken up. Naturally B days become fewer the larger the area but the amount per day is heavier. The geographical distribution of precipitation is shown to be determined by the B rains. *Subject Headings:* **1. Rainday distribution 2. Austria.**—*C.E.P.B.*

8.2–228 551.577.32:551.542(43)

Bauer, Franz, **Die Ursachen des verregneten Sommers 1956.** [The causes of the rainy summer 1956.] *Umschau*, 56(20):628–630, Oct. 15, **1956.** 4 figs., 3 refs. **DLC**—Rainfall in Germany in June through Aug. 1956 was 156% of normal. This was not due either to condensation nuclei or heat liberated by atom bomb explosions. The immediate cause was a pressure distribution (high over N. Atlantic, low over central Europe) which brought cool moist air over Germany. Aug. 1882 was similar, whereas in the hot dry July 1911 high pressure extended east over Scandinavia and North Russia. The cause of the pressure varia-

tions is sought in changes of solar radiation, especially of ultraviolet in the sunspot cycle, but investigation is difficult. *Subject Headings:* **1. Rainy seasons 2. Pressure distribution 3. Germany.**—*C.E.P.B.*

8.2–229 551.577.33(42)

Brooks, C. E. P., **Can we count on four fine summers?** *John Bull*, 100(2626):26 27, Oct. 27, **1956.** fig., photo. **GB-MO**—In this popular article, after a short discussion of annual recurrences of weather, periodicities in English rainfall from 20 months to 52 years are described. The annual rainfalls are synthesized from these for 1920–1980 and compared with the actual rainfall for 1920–1955. Finally the effects of secular warming up, and "rain making," are discussed. *Subject Headings:* **1. Rainfall periodicities 2. England.**—*C.E.P.B.*

8.2–230 551.577.34(427)

Barnard, G. A., **The statistics of rainfall regimes: some comments on Mr. Reynolds's note.** *Weather*, 11(9):273–275, Sept. **1956. DWB**—Criticizes G. REYNOLDS: **Abrupt changes in rainfall regimes,** *Weather*, 11(8):249–254, Aug. **1956** (*see* 7.11–253, Nov. 1956, *MAB*), on the ground that the statistical criteria of reality adopted are not sound. The structure found in the Bidston rainfall series may be due to selection, though it may be real. *Subject Headings:* **1. Rainfall trends 2. Bidston, Liverpool, Eng.**—*C.E.P.B.*

8.2–231 551.577.34(410)

Gregory, S., **Regional variations in the trend of annual rainfall over the British Isles.** *Geographical Journal*, London, 122(3):346–353, Sept. **1956.** 3 figs., 6 refs. **DWB**—Ten year running means of annual rainfalls, 1881–1950 for 50 stations and 1901–30 for >200, were plotted; 18 examples are shown. A difference of twice standard deviation between two 10-year means was taken to indicate a trend. Four types of trend are mapped. Three show a marked rise from 1880's to 1920's, followed by a fall, but differ in detail. The fourth (W. Scotland and N. Ireland) had an early maximum and a large central fall. Bearing on water supply problems is discussed. *Subject Headings:* **1. Rainfall trends 2. British Isles.**—*C.E.P.B.*

8.2–232 551.577.36

Jenkinson, A. F. and Lewis, R. P. Waldo, **Pattern of rainfall.** *Meteorological Magazine*, London, 85(1009):208–210, July **1956.** 2 tables, 2 refs., 8 eqs. **DWB**—Referring to A. B. THOMSON, *Met. Mag.*, 83:293, 1954 (*see* 6.3–261, March 1955, *MAB*), JENKINSON considers various equations for the number of hours N_r with rainfall $\geq r$ mm and finds $\log_{10} R/N_r = 0.05 + 0.58\sqrt{r}$, R = total rainfall. This gives a much better fit than THOMSON's equation. WALDO LEWIS objects that this has no theoretical justification and suggests an alternative. *Subject Heading:* **1. Precipitation frequencies.**—*C.E.P.B.*

8.2–233 551.577.36:519.241(569.4)

Neumann, J., **On the incidence of dry and wet years.** *Israel. Meteorological Service, Series D, Contributions*, No. 7:58–63, **1956.** tables, 3 refs., 4 eqs.—*Repr. from: Israel Exploration Journal*, Jerusalem, 6(1):58–64, **1956. DLC**—The terms "dry and wet years" are used for years with low or high annual rainfall totals. Their frequency can be computed with sufficient accuracy from the "normal" distribution. This is illustrated by comparison of number of years observed and expected, at Jerusalem and Beirut, which departed from the mean by specified multiples of the standard deviation. *Subject Headings:* **1. Rainfall frequency distribution 2. Israel.**—*C.E.P.B.*

8.2–234 551.577.37:551.583.3(6)

Davies, O., **African Pleistocene pluvials and European glaciations.** *Nature*, London, 178(4536):757–758, Oct. 6, **1956.** table, 7 refs. **DWB**—From researches in West Africa, the author finds a pleistocene sequence of 3 pluvials and 2 interpluvials as far north as 25°N. There was only a minor dry phase within the second interpluvial, and no long arid period corresponding to the Mindel-Riss interglacial. This makes the theories of SIMPSON and MILANKOVICH both untenable. *Subject Headings:* **1. Pluvial periods 2. Africa.**—*C.E.P.B.*

8.2–235 551.577.37:632.7:633.51(624)

Goodman, Alan and Toms, A. M., **Effect of rainstorms upon the cotton jassid in the Sudan Gezira.** *Nature*, London, 178(4530):436, Aug. 25, 1956. 2 tables, 2 refs. **DWB**—Effect of rainstorms >10 mm in Sept.–Oct. on *Empoasca lybica*, a pest of the seedling crop, was studied. The mean population of a sub-plot decreased from 20.0 to 12.8. A storm of 16–29 mm was particularly effective. *Subject Headings:* **1. Rainstorms 2. Cotton pests 3. Sudan.** —*C.E.P.B.*

8.2–236 551.577.38(42)

Booth, R. E., **The dry weather in England and Wales during the first half of 1956.** *Meteorological Magazine*, London, 85(1011):274–275, Sept. 1956. **DWB**—Rainfall Feb.–May nearly everywhere <75%, locally <33%. Feb.–May 1956 and July 1955–May 1956 were the driest on record. *Subject Headings:* **1. Drought 2. England.**—*C.E.P.B.*

RAIN, SNOW AND HAIL

See also: **Firn temp. and ablation, Antarctica** (Loewe), 8.2–6; **Drops on filter paper** (Jarman), 8.2–82; **Separation of water from snow** (LaChapelle), 8.2–84; **Acidity and salinity of rain** (Gorham), 8.2–104; **Ice cloud forms** (Ludlam), 8.2–215; **Duration of snow cover, Europe** (Küchle-Scheidemantel), 8.2–261.

8.2–237 551.578.1:551.577.51:551.574.41:551.508.77

Nagel, J. F., **Fog precipitation on Table Mountain.** *Royal Meteorological Society, Quarterly Journal*, 82(354):452–460, Oct. 1956. 7 figs., 2 tables, 12 refs. **DWB**—Fog precipitation from the Table Cloth on Table Mountain was measured for a year (1954–5) with 2 autographic rain gages, one equipped with a gauze cylinder to catch fog or cloud droplets. Winds were also measured. The efficiency of fog collection is discussed. Rainfall was 1940 mm in 1059 hrs, or 1.84 mm/hr, fog precipitation 3294 mm in 876 hrs or 3.75 mm/hr. Calculated fog precipitation is about 12 times this; reasons for the discrepancy are discussed. *Subject Headings:* **1. Fog precipitation 2. Table Mountain, South Africa.**—*C.E.P.B.*

8.2–238 551.578.11:532.5

†Lane, W. R. and Green, H. L., **The mechanics of drops and bubbles.** (In: Batchelor, G. K. and Davies, R. M. (*eds.*), **Surveys in mechanics.** Cambridge (Eng.) Univ. Press, 1956. p. 162–215. 13 figs., 7 tables, 49 eqs., bibliog. p. 212–215.) **DLC**—Pt. 1 deals first with the shape and detachment of a pendant drop and production of drops from tips, spinning disk and swirl chamber. Pt. 1, Sec. 4 summarizes information on behavior of falling drops—terminal velocities of spherical and large drops, effects of eddies, shape and internal circulation. Sec. 5 deals with the break-up of drops in transient blasts and steady streams of air, Sec. 6 with deposition of drops on obstacles and Sec. 7 briefly with collection efficiency of drops falling through a cloud of droplets. Pt. 2 deals with production, ascending motion, terminal velocity and bursting of bubbles. *Subject Headings:* **1. Drop properties 2. Bubbles 3. Hydrodynamics.**—*C.E.P.B.*

8.2–239 551.578.11:551.579.5:631.4

Pereira, H. C., **A rainfall test for structure of tropical soils.** *Journal of Soil Science*, Oxford, 7(1):68–74, Jan. 1956. 2 figs., plate, table, 13 refs. **DLC**—The ability of the soil surface to accept continuous heavy rainfall is a critical factor in the prevention of accelerated erosion of tropical soils. The qualities required in the soil are complex, and are not easily inferred from simple laboratory measurements. A direct test has therefore been developed for this property. Large soil cores of undisturbed structure are brought to a standard moisture tension, and are subjected to heavy artificial rainfall of controlled drop-size and intensity. The drainage tension is maintained at a constant value, and the rate of infiltration is measured. The apparatus is described in detail. Examples of results from a tropical rotation experiment are given, in comparison with pore-space and percolation measurements. Percolation rate and rainfall acceptance increased in grass from 1 to 3 years as a result of increase of termite population. *Subject Headings:* **1. Rainfall effect on soil 2. Soil permeability.**—*Author's abstract, C.E.P.B.*

8.2–240 551.578.41

Chaplin, J. H., **A note on snow crystal types in the Falkland Islands Dependencies.** *Journal of Glaciology*, 2(20):733–734, Oct. 1956. table, 2 refs. DWB—Frequencies of 10 types at South Shetlands and Graham Land are tabulated in relation to temperature and synoptic type. No comments are made except preponderance of plate forms with warm fronts and of columns and dendrites with cold fronts. *Subject Headings:* **1. Snow crystals 2. Temperature effects on snow.**—*C.E.P.B.*

8.2–241 551.578.41

Higuchi, K. (*Hokkaido Univ., Sapporo, Japan*), **On the size of single snow crystals and elements forming snow flakes.** *Meteorological Society of Japan, Journal*, Ser. 2, 33(1):9–22, Feb. 1955. 8 figs., 4 tables, 10 refs. In Japanese; English summary p. 9. DWB—The size distribution of snow crystals, found from shadow photos on mountain slopes 1050 m a.s.l., is tabulated for needles, columns, plates, dendrites and powder snow, and the number per m^3 and mean distance in cm between individual crystals given for each type. Needles and plane dendrites are variable, others consistent. Average length of columns 2.84 mm; axis ratio increased with length from 1.3 to 2.75. Data on distribution of separate crystals (2–16) forming a snowflake are given and the probability of coagulation calculated. *Subject Headings:* **1. Snow crystals 2. Snowflake coalescence.**—*C.E.P.B.*

8.2–242 551.578.46

Gold, Lorne W., **The strength of snow in compression.** *Journal of Glaciology*, 2(20):719–725, Oct. 1956. 6 figs., 8 refs. English and German summaries p. 719. DWB—Physics of snow compression under load are discussed. In a snow survey in Canada hardness was measured by a circular plate pressed into the surface. (Snow Hardness Gage NRC type); observations are plotted. Hardness increases with density and temperature; change with change of temperature is $e^{-0.0631}\ (T_2 - T_1)$°C. It also varies with crystal size being least with 3 mm crystals, and varies greatly with bonding between crystals. *Subject Heading:* **1. Snow mechanics.**—*C.E.P.B.*

8.2–243 551.578.46(411)

Spink, P. C., **Snow survival.** *Weather*, 11(9):302, Sept. 1956. DWB—Referring to L. C. W. Bonacina: **Snow survival on Scottish mountains,** *Weather*, 11(5):169, May 1956, Spink attributes the much greater size of surviving snow beds on Ben Nevis in 1954 to more fronts giving snow at high levels and a cool cloudy summer. *Subject Headings:* **1. Snow cover duration 2. Scotland.**—*C.E.P.B.*

8.2–244 551.578.7(669)

Benzies, George Y., **Tropical ice-crystals.** *Weather*, 11(10):335, Oct. 1956. fig. DWB—Ice plates nearly 1″ diameter and $\frac{1}{4}$″ thick, with a slightly opaque center containing smaller ice crystals fell from a CuNb at Jos, Northern Nigeria. At air temperature 68°F they took 15 min to melt. *Subject Headings:* **1. Hailstones 2. Nigeria.**—*C.E.P.B.*

8.2–245 551.578.7(422)

Booth, R. E., **Severe hailstorm at Tunbridge Wells on August 6, 1956.** *Meteorological Magazine*, London, 85(1012):297–299, Oct. 1956. fig., 2 photos. DWB A cold depression moving S. was accompanied by funnel clouds and thunderstorms, one of which gave the worst hailstorm for 30 years at Tunbridge Wells, Kent. Tephigram is shown. Undrifted hailstones $\frac{1}{4}$–$\frac{5}{8}$″ diameter lay to a depth of 2″. There was extensive flooding and much damage to crops. *Subject Headings:* **1. Hailstorms 2. Tunbridge Wells, Eng.**—*C.E.P.B.*

8.2–246 551.578.89

Ashmore, S. E., **Showers of fishes, frogs and what-not?** *Weather*, 11(6):205, June 1956. DWB—Mentions a number of cases during the present century. *Subject Heading:* **1. Showers of fishes.**—*C.E.P.B.*

HYDROMETEOROLOGY

See also: **New application of gypsum blocks** (Köhn), 8.2–59; **Soil moisture deficits . . .** (Goode), 8.2–210; **Soil moisture movement . . .** (Renman), 8.2–211; **World circulation and exchange of water,** 8.2–213; **Rainfall effect on soil** (Pereira), 8.2–239.

8.2–247 551.579:537.723:551.48(282.26)

Beauchamp, R. S. A., **The electrical conductivity of the headwaters of the White Nile.** *Nature*, London, 178(4534):616–619, Sept. 22, **1956.** fig., table, 4 refs. **DWB**—Electrical conductivities of water of lakes contributing to the White Nile vary from 910 for Lake Edward to 100 for Lake Victoria. They depend on concentration of dissolved electrolytes. The relative contributions of these lakes to the White Nile are estimated from the varying conductivity of the river water, especially of the Semliki. Mechanics of flow are discussed and effect of raising the level of Lake Albert on river flow, biology and temperature are considered. *Subject Headings:* **1. River flow 2. Electrical conductivity of rivers 3. White Nile.**—*C.E.P.B.*

8.2–248 551.579:06

Glasspoole, J., **The Institution of Water Engineers Symposium on hydrology.** *Meteorological Magazine*, London, 82(969):90–91, March **1953. DWB**—Brief summary of discussion on Nov. 12, 1952 of papers on Hydrological measurements, Estimation of yield (overground and underground) and Pumping tests on chalk wells. *Subject Headings:* **1. Hydrology 2. Institution of Water Engineers.**—*C.E.P.B.*

8.2–249 551.579 551.501:551.577(410)

*Institution of Civil Engineers, London. Hydraulics Committee, **Recent developments in hydraulics.** *Institution of Civil Engineers, Proceedings*, Pt. 3, 4:990–1049, Dec. **1955.** numerous refs. **GB-MO**—This report is divided into 3 sections, each with a large bibliography: 1) flow in closed pipes; 2) flow in open channels; 3) rainfall and runoff. The last (63 refs.) covers rainfall instrumentation and observation, mapping, variation with time and place, and incidence of intense storms. Measurement of runoff is similarly treated, and then the relation between rainfall and runoff is taken up. Formulas are quoted for incidence of heavy rainfalls, numbers and intensities of flooding runoffs. *Subject Headings:* **1. Hydrology 2. Rainfall observation 3. Rainfall intensity distribution 4. Runoff 5. British Isles.**—*C.E.P.B.*

8.2–250 551.579:627.8

Vas, Oskar, **Probleme der Kraftwasserwirtschaft in Mitteleuropa.** [Problems of water power economy in central Europe.] *Umschau*, 52(7):206–208, April 1, **1952.** 6 figs. **DLC**—An account of new methods of construction of dams, with photos, and a reference to the political problems involved where rivers cross national boundaries. *Subject Headings:* **1. Water power 2. Dams 3. Central Europe.**—*C.E.P.B.*

8.2–251 551.579.4

River floods in Great Britain. *Nature*, London, 172(4372):263–265, Aug. 15, **1953. DWB**—Editorial on the necessity for precautions against river floods due to exceptional rains in small catchment areas. A committee of enquiry is called for. *Subject Headings:* **1. Floods 2. Great Britain.**—*C.E.P.B.*

8.2–252 551.579.4(94)

Rudeforth, B. F., **The Ord River.** *Western Australia. University. Geographical Laboratory, Research Report*, No. 17, July **1950.** 6 p. diagr., 2 refs. Mimeo. **NNA**—Mainly geographical; includes some data on volume of flow. *Subject Headings:* **1. Hydrography 2. Ord River, Australia.**—*C.E.P.B.*

8.2–253 551.579.5

Rettig, Helmut, **Beitrag zum Problem der Wasserbewegungen im Boden.** [Contribution to the problem of water movements in the ground.] *Meteorologische Rundschau*, 9(9/10):182–184, Sept./Oct. **1956.** fig., 5 tables, 6 refs. **DWB**—The parts of gravity, capillary action and heat in movements of soil moisture are discussed. Soil moisture movements at Neustadt in

May 1956 are compared with air and soil (to 1 m depth) temperature, rainfall, evaporation from bare soil and saturation deficit. June 1955 (1–10 very wet) and Jan. 1955 (soil frozen) are also discussed. Changes of volume of soil air by temperature and pressure are unimportant; the main factor is transport of moisture in the direction of the vapor pressure gradient. *Subject Heading:* **1. Soil moisture variations.**—*C.E.P.B.*

CLIMATOLOGY AND BIOCLIMATOLOGY

CLIMATOLOGY

8.2–254 551.58:6

Climatology in the service of man. *Nature*, London, 178(4536):729–730, Oct. 6, **1956. DWB**—Account of discussion at British Association 1956. G. MANLEY dealt with bearing of temperature variations on fuel demands. M. PARRY described the factors of heat loss from a house and their local variations. ALICE GARNETT referred to atmospheric pollution in the Sheffield area and MISS E. M. FRISBY to advisory work in the U. S. Various speakers dealt with problems of evaporation and water conservation. Throughout the discussion the value of cartographical methods was evident. *Subject Heading:* **1. Applied climatology.**—*C.E.P.B.*

8.2–255 551.58:6(4)

Miller, A. Austin, **The use and misuse of climatic resources.** *Nature*, London, 178(4531): 474, Sept. 1, **1956. DWB**—Summary of address to Sec. E (Geography) of British Association, setting out need for planning according to the climate, in agriculture, water for power and industry, etc. Suggestions are made for avoiding threatened shortage of water in Britain. *Subject Headings:* **1. Applied climatology 2. Addresses.**—*C.E.P.B.*

CLIMATE OF PARTICLUAR PLACES

See also: **Japan pilot** (Gt. Brit. Hydrographic Off.), 8.2–2; **Climatic fluctuations, Bristol** (Hannell), 8.2–265.

8.2–256 551.582(7,8)

The climate of the world. 6. North America. *Weather*, 8(2):47–50, Feb. **1953.** 30 diagrams. . . . **7. South America.** *Ibid.*, 8(7):210–213, July **1953.** 31 diagrams. **DWB**—The first article contains graphs of annual variation of max. and min. temperature, mean pressure and rainfall, for stations from Angmagsalik and Dawson City to Balboa Heights. In the second article graphs show, for each month, mean daily max. and min. temperature, mean pressure and rainfall, for 30 stations from Havana (Cuba) to Punta Arenas. These two articles are reproductions of a series of graphs copyrighted by and reproduced by permission of George Philip and Sons (publishers of atlases). *Subject Headings:* **1. Climatic data 2. North America 3. South America.**—*C.E.P.B.*

8.2–257 551.582(411)

Davies, G. L., **The parish of North Uist.** *Scottish Geographical Magazine*, 72(2):65–80, Sept. **1956.** 4 figs., 26 refs. **DLC**—Includes a brief note on climate of this island in the Outer Hebrides, with monthly averages of rainfall at 2 stations. *Subject Headings:* **1. Local climates 2. North Uist, Scotland.**—*C.E.P.B.*

8.2–258 551.582(410)

Lawrence, E. N., **September in Britain—autumn or summer?** *Weather*, 8(9):259–261, Sept. **1953.** 5 refs. **DWB**—Note on beauty of Sept. in Britain, and change to winter in Oct., with poetic quotations. *Subject Headings:* **1. Local climates 2. Great Britain.**—*C.E.P.B.*

8.2–259 551.582(42):63

Moore, H. I., **The grassland of Devon.** *Great Britain. Ministry of Agriculture, Journal*, 59(4):163–168, July, **1952. DA**—Includes an account of cattle raising in a mild climate with good rains through the year. Many other articles in the same issue deal with various aspects

of agriculture in Cornwall, Devon and Somerset, with incidental references to climate. *Subject Headings:* **1. Agricultural climatology 2. Devon, Eng.**—*C.E.P.B.*

8.2–260 551.582.2(55)

*Beckett, P. H. T. and Gordon, E. D., **The climate of Kerman, South Persia.** *Royal Meteorological Society, Quarterly Journal*, 82(354):503–514, Oct. **1956.** 3 figs., 11 tables, 8 refs. **DWB**—Observations at Kerman (30°21′N, 57°10′E, 5600 ft a.s.l.) mostly for 1909–15, some for 1941–50 in the Persian calendar, are tabulated or graphed. They include wind velocity and direction, mean daily and monthly maximum and minimum temperature, monthly precipitation, cloud amount and humidity. Winds are light, winters cold and summers very hot, annual rainfall 5.3–5.4″, very variable, on 18 days. Some data for other stations are added for comparison. Possible applications in raising water by wind power, and in agriculture, are discussed. *Subject Headings:* **1. Local climates 2. Kerman, Persia.**—*C.E.P.B.*

8.2–261 551.582.3:551.578.46(4)

†Küchle-Scheidemantel, Ingrid, **Die Dauer der Schneedecke in Europa.** [Duration of snow cover in Europe.] *Petermanns Geographische Mitteilungen*, 100(3):185–192, **1956.** fold. chart, 213 refs. **DLC**—"Duration of snow cover" is defined as the mean annual number of days with snow cover, "Snow cover time" as the interval between first and last days of snow cover, "Persistent snow cover" as the mean duration of the longest persistent snow cover. The definition "snow cover" varies; author favors "more than half the surroundings covered by a layer at least 1 cm thick." An enormous amount of material is gathered in a large folding chart covering Europe, Iceland, N.W. Africa and W. Asia, ranging from <1 to >240 days. The seasonal distribution, synoptic situations and relation to oceanicity are discussed. *Subject Headings:* **1. Snow cover charts 2. Europe.**—*C.E.P.B.*

CLIMATIC VARIATIONS

See also: **Physiographic processes** (Drury), 8.2–3; **African Pleistocene pluvials** (Davies), 8.2–234.

8.2–262 551.583

†Veryard, R. G., **Some thoughts on climatic change.** *Weather*, 11(11):355–364, Nov. **1956.** 2 figs., 41 refs. **DWB**—Accumulated temperature graphs for British stations show that climate may vary appreciably with important economic consequences, but determination of such trends is difficult. Variable factors of climate are briefly considered—solar radiation, including ultraviolet and corpuscular, interstellar matter, "geometrical variability of insolation," dust (man-made and volcanic), ozone, CO_2, earth's albedo, configuration of the earth, ocean currents, pole-wandering etc. None of these explain climatic changes in historic time, which may be due to some form of climatic trigger action through the atmospheric circulation. *Subject Heading:* **1. Climatic change theories.**—*C.E.P.B.*

8.2–263 551.583.1:551.577.34(51,52)

Arakawa, H., **Two minima of the average rainfall at about the turn of the Century and at about 1940 in the Far East.** *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):406–412, **1956.** 5 figs., 2 tables, 5 refs. English, German and French summaries p. 406. **DWB**—Monthly river gage readings at Hankow, China, 1865–1937, show minima of the annual flood about 1880 and 1900. Rainfall at Seoul 1770–1944 shows minima about 1885–1905 and 1940. Average rainfall of 6 stations in Japan 1886–1954 also shows minima about 1890 and 1930–40. These changes are brought out by 10-year running means. *Subject Headings:* **1. Rainfall trends 2. China 3. Korea 4. Japan.**—*C.E.P.B.*

8.2–264 551.583.1(41)

†Goedecke, Erich, **Zur Frage der rezenten Klimaschwankung über den Britischen Inseln und zum Problem der säkularen Erwärmung auf der Nordhalbkugel.** [On the recent climatic oscillation over the British Isles and the problem of the secular warming of the Northern

Hemisphere.] *Annalen der Meteorologie*, 7(5/6):225–249, **1955/56.** 8 figs., 8 tables, 45 refs. German and English summaries p. 225–226. **DWB, DLC**—J. GLASSPOOLE's data (*Met. Mag.* 1954, 1955, *see* 5.7–177, July 1954 and 6.6–305, June 1955, *MAB*) of differences of temperature, sunshine, pressure and rainfall, 1921–50 minus 1901–30, are discussed in detail. The course of temperature since 1740 in Lancashire and British Isles is examined by seasons, and compared with that in Holland and Sweden. Wide fluctuations are superposed on a steady rise; cold winters come in groups. The atmospheric circulation has increased since 1850 (more W-S winds). The temperature change in the Northern Hemisphere has progressed from S to N; Central Europe reached its max in 1920, but rise in Arctic is not yet over. These changes are related to displacements of Siberian high westwards, Iceland and Aleutian lows eastwards. There has been no comparable change in S. Hemisphere. Increases due to warming of towns and CO_2 are discussed. *Subject Headings:* **1. Climatic variations 2. British Isles.**—*C.E.P.B.*

8.2–265 551.583.14 551.582.2(423)

Hannell, F. G., **Climatic fluctuations in Bristol.** *Advancement of Science*, London, 12(48): 373–386, March **1956.** 7 figs., table, 10 refs. **DLC**—Bristol lies on the 30 in. isobar, close to boundary between maritime and continental climate, and climate oscillates markedly. Eleven year running averages are plotted for Bristol and Kew for winter, summer and annual rainfall and temperature, cumulative deviations of rainfall and range of temperature. All these show alternating periods of continental and maritime climate. Other stations are compared and Northern Hemisphere pressure anomalies shown for dry periods and a wet period to illustrate migration of pressure belts. These migrations are attributed to changes in the velocity of the circumpolar whirl. *Subject Headings:* **1. Climatic trends 2. Bristol, Eng.**—*C.E.P.B.*

8.2–266 551.583.2:551.311.12(797)

Bengtson, Kermit B., **Activity of the Coleman Glacier, Mt. Baker, Washington, U.S.A., 1949–1955.** *Journal of Glaciology*, 2(20):708–713, Oct. **1956.** 3 figs., 4 refs. English and German summaries p. 708. **DWB**—Glacier was in rapid retreat till 1949 but in 1949 it was thickening above the terminus. Since then the whole glacier has thickened and terminus advanced 300 m. Weather in 1948–55 was unusually snowy, and summers cool and cloudy. *Subject Headings:* **1. Glacier variations 2. Washington.**—*C.E.P.B.*

8.2–267 551.583.2:551.311.12(988)

Wyllie, P. J., **Ice recession in Dronning Louise Land, North-east Greenland.** *Journal of Glaciology*, 2(20):704–708, Oct. **1956.** map, 2 photos, 3 refs. English and German summaries p. 704. **DWB**—The glaciers were formerly of much greater thickness and are now thin. The decrease is attributed to a decrease of the Greenland ice cap and emergence of thresholds over which the glaciers are supplied. This may also apply to other glaciers in Greenland. *Subject Headings:* **1. Glacier retreat 2. Greenland.**—*C.E.P.B.*

8.2–268 551.583.3:551.311.13(48)

Kummerow, Egmont, **Die Bewegungsrichtung des diluvialen Inlandeises in Nordeuropa.** [The direction of motion of the glacial inland ice in Northern Europe.] *Forschungen und Fortschritte*, 30(11):326–330, Nov. **1956.** 4 figs., refs. **DLC**—Scandinavia, especially in the west, had a higher precipitation than now, and ice accumulated on the mountain plateaus to a depth of much over 3000 m. The ice divide lay far east of the mountain divide. The ice flow is mapped in detail; a schematic diagram shows the main flow down the Gulf of Bothnia turning west in the Baltic to meet over Denmark another flow down Oslo fjord. *Subject Headings:* **1. Glacial periods 2. Scandinavia.**—*C.E.P.B.*

8.2–269 551.583.3:551.311.15

Rathjens, Carl, **Über die Zweiteilung der Würmeiszeit im nördlichen Alpenvorlande.** [On the division into two of the Würm glaciation in the northern Alpine foreland.] *Petermanns Geographische Mitteilungen*, Gotha, 95(2):89–97, **1951.** 6 figs., 37 refs. Also: Knauer, Joseph, **Die Zweiteilung der Würmeiszeit im nördlichen Alpenvorlande.** [Comment on Rathjens' article.] *Ibid.*, 97(4):265–267, **1953.** 2 figs., 5 refs. **DLC**—The first article is a comprehensive review of evidence from many sources for the division into two of the Würm glacia-

tion in the norther Alpine foreland. Second article is a criticism of RATHJENS' work. *Subject Headings:* **1. Glacial periods 2. Würm glaciation.**—*C.E.P.B.*

8.2–270 551.583.3:551.311.13(481)

Strøm, Kaare, **The disappearance of the last ice sheet from central Norway.** *Journal of Glaciology*, 2(20):747–755, Oct. **1956.** 11 figs., 6 refs. English and German summaries p. 747. **DWB**—From researches in a number of regions block diagrams are constructed showing various stages of deglaciation, mainly by down-wasting of dead ice. There is some evidence of climatic fluctuations during the down-wasting. *Subject Headings:* **1. Glacial period 2. Norway.**—*C.E.P.B.*

8.2–271 551.583.7:550.384:551.7

Clegg, J. A., **Rock magnetism.** *Nature*, London, 178(4542):1085–1087, Nov. 17, **1956.** 17 refs. **DWB**—An interesting discussion at the 1956 meeting of the British Association is summarized. P. M. S. BLACKETT, A. E. M. NAIRN and J. A. CLEGG all described recent work which showed that the continents have moved relative to the magnetic poles and to each other. This is borne out by a good deal of paleoclimatic evidence, especially the Permo-Carboniferous glaciations, but there are still difficulties. The meaning of sudden reversals of magnetization is still unsolved. *Subject Headings:* **1. Paleomagnetism 2. Geological climates.**—*C.E.P.B.*

8.2–272 551.583.7:550.384(54)

Clegg, J. A.; Deutsch, E. R. and Griffiths, D. H., **Rock magnetism in India.** *Philosophical Magazine*, 8 Ser., 1(5):419–431, May **1956.** 3 figs., table, 14 refs. **DWB**—Samples of Deccan trap (late Cretaceous Early Eocene) from India are mostly magnetized in direction N 155°E, dip 53° down. This is almost perpendicular to present field. The preferred explanation is that Central India was in about 34°S, 5000 km from its present position, and rotated anticlockwise 25°. India must have moved relative to N. Europe and N. America. The Permo-Carboniferous glaciation suggests a further movement from about 65°S, while S. Africa drifted right across present South Pole. *Subject Headings:* **1. Paleoclimates 2. Paleomagnetism 3. India.**—*C.E.P.B.*

MICROCLIMATOLOGY

See also: **Science and coal industry,** 8.2–85; **Greenhouse radiation** (Seemann), 8.2–143; **Bergschrund temps., Baffin Island** (Thompson, Bonnlander), 8.2–165; **Frost height determination on valley slopes** (Schnelle), 8.2–169; **Continental effects on thermal structure of an air mass** (Faust), 8.2–170; **Ion variations in open and closed rooms** (Dessauer et al.), 8.2–308.

8.2–273 551.584.2:69

Manley, G., **Microclimatology: local variations of climate likely to affect the design and siting of buildings.** *Royal Institute of British Architects, London, Journal*, 56:317–323, **1949.** 3 figs., 4 tables, 22 refs. Discussion p. 322–323. **DLC**—A general essay on local climatology. The effect of topography, frost hollows, water bodies, soil and urban areas on minimum temperatures is illustrated by examples from Great Britain. Effect of local topography on pollution is important in planning industrial areas. Land and sea breezes, slope winds and urban frictional effects are described. *Subject Headings:* **1. Microclimatology 2. Building climatology.**—*C.E.P.B.*

8.2–274 551.584.2(431) 551.586:614.7:615.83

Zenker, H., **Lokalklimatische Studien in Heringsdorf/Usedom.** [Local climatic studies in Heringsdorf (Uznam).] *Angewandte Meteorologie*, 2(10):289–300, Oct. **1956.** 6 figs., 7 tables, 12 refs. **DLC**—At 13–14 h, Nov. 1951 through Oct. 1954, daily observations were taken at 6 places on the island from 150 m seaward to 600 m inland (woodland). Annual variation of temperature is plotted for days of land and sea breeze with and without sun. The warm sheltered promenade with maritime aerosol is especially favorable for patients. Mean

wind speed decreased inland from 5.2 to 0.7 m/s. Cooling power by BÜTTNER's formula and numbers of days giving sensations from hot to very cold are shown for each month. An aerosol wind rose and frequency distributions are shown. Maximum temperature in dune sand from surface to 20 cm and at 2 m are plotted. *Subject Headings:* **1. Coastal climates 2. Bioclimatology 3. Heringsdorf, Poland.**—*C.E.P.B.*

8.2–275 551.584.6:685.531

Köntopp, H., **Ergebnisse von Zeltklimastudien bei Schönwetter und Schlechtwetter.** [Results of tent climate studies in fine and disturbed weather.] *Angewandte Meteorologie*, 2(10):317–322, Oct. **1956.** 5 figs., table. **DLC**—As a basis for improving tent design, observations were made in an unoccupied tent in Berlin in hot weather and in a large occupied tent on Baltic coast in bad weather. In hot weather maximum temperature in the tent was higher than in the screen by 8–15°C (greatest on days of uninterrupted sunshine). After 22 h tent temperature fell to or below screen temperature. On the Baltic weather was cloudy with a good deal of rain and low temperature for summer. Soil temperature at 2 and 5 cm varied much less in the tent than in open. Cooling power was much less in the tent (20–25 mgcal/cm²/sec) than in the open (30–40), giving more comfortable conditions. *Subject Heading:* **1. Tent climates.**—*C.E.P.B.*

8.2–276 551.584.61:631.56:633.491

Wilson, A. R. (*A.R.C. Potato Storage Investigation, Sutton Bonington*), **Potatoes: indoor storage: a review of requirements.** *Agricultural Review*, London, 1(12):18–23, May **1956.** 4 figs., 8 refs. **DA**—Indoor storage of potatoes is rapidly increasing through lack of straw for clamps, labor difficulties, etc. Ventilation is essential. Restriction of sprouting and evaporation requires a delicate balance of temperature. Condensation must be avoided. *Subject Heading:* **1. Potato storage.**—*C.E.P.B.*

8.2–277 551.584.61:551.586

Würfel, H., **Raumklima, Aussenklima und ihre Wirkungen auf den Menschen.** [Room climate, outdoor climate and their effects on man.] *Angewandte Meteorologie*, 2(10):301–310, Oct. **1956.** 6 figs., 2 tables, 22 refs., 12 eqs. **DLC**—Author made bioclimatic measurements daily for a year at 11 h in a living room and hospital room (heated in winter) near Berlin and in the open (shade), and also noted his warmth sensation. Indoors forehead temperature (T_{SF}) increased with air temperature and decreased with increase of cooling power. In the open T_{SF} was related to air temperature T_{LF} by

$$T_{SF} = 19.6\ T_{LF}^{0.17}.$$

Other formulas are derived. Warmth sensation in the open in calm is plotted against cooling power, air temperature and wind and against air temperature and relative humidity. The effect of wind agrees with that found by L. HILL and F. BRADTKE. *Subject Headings:* **1. Indoor climates 2. Bioclimatology 3. Berlin, Germany.**—*C.E.P.B.*

CLIMATIC CLASSIFICATION

8.2–278 551.585.1(269)

*Vowinckel, E., **Das Klima des Antarktischen Ozeans. I. Nord-Süd-Schnitt zwischen 20 und 40°E. II. West-Ost-Schnitt zwischen 50°W und 150°E.** [The climate of the Antarctic Ocean, Pt. 1, N-S section between 20 and 40°E. Pt. 2, W-E section between 50°W and 150°E.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):317–369, **1956.** 7+13 figs., 5+9 tables, 13 refs. German, English and French summaries p. 317–318, 342–343. **DWB**—Ships' observations in the Antarctic Ocean from 54°S south of Africa are summarized (mainly Nov.–March) and show some interesting features, including an almost isothermal zone in 56–64°S (Jan. temperature 36.1–33.4°F). Sea temperature, heat balance, cloud, weather and wind are also discussed, with 3-day means. Variations of circulation and changes of temperature from year to year 1933–1955 are also discussed. The position of the pressure trough fluctuates considerably; there has been a progressive rise of temperature

in summer. Pt. II deals on similar lines with the ocean in 58–66°S from Palmer Peninsula east to Ross Sea. The cold tongue extending northwards from the Weddell Sea and the warm tongue off Enderby Land are discussed. The last section deals with the synoptic weather types. *Subject Headings:* **1. Climatic surveys 2. Antarctic Ocean.**—*C.E.P.B.*

BIOCLIMATOLOGY

See also: **Bioclimatic research institutes** (Häberlin), 8.2–24; **Weather and vegetative nervous system** (Straube), 8.2–58; **London fog** (Waller, Lawther), 8.2–109; **Local climate, Heringsdorf** (Zenker); 8.2–274; **Indoor and outdoor climates—effects on man** (Würfel), 8.2–277.

8.2–279 551.586:061.2

Delany, M. J. and Waterhouse, F. L., **International Society of Bioclimatology and Biometeorology.** *Nature*, London, 178(4540):966, Nov. 3, **1956. DWB**—Account of the inaugural meeting in Paris, Aug. 29–31, attended by 60 members. The wide scope of the Society was defined, President (F. SARGENT, U.S.) and other officers elected, and some area reports and papers read. The next meeting will be in Vienna in 1957. *Subject Headings:* **1. Societies 2. International Society of Bioclimatology and Biometeorology.**—*C.E.P.B.*

8.2–280 551.586:572.5

Kurth, Gottfried, **Überlegungen zu den zoogeographischen Klimaregeln nach Untersuchungsbefunden beim Menschen.** [Thoughts on zoogeographical climatic rules from investigations on man.] *Forschungen und Fortschritte*, Berlin, 30(10):293–297, Oct. **1956.** footnote refs. **DLC**—There is no correlation between body height and climate but a negative relation between weight and temperature. Height decreased from end of ice age to neolithic (possibly due to change over to agriculture) and then increased again with increased consumption of flesh. The subject is very complicated, for example small growth and thinness of inland tropical peoples may be due to undernourishment, and small arctic races (Esquimaux, Lapps) may have been ousted from more favorable regions. Generally, body size is greater in cold climates because it favors heat regulation. *Subject Heading:* **1. Human climatology.**—*C.E.P.B.*

8.2–281 551.586:581.54

Thomas, R. G., **Effects of temperature and length of day on the sex expression of monoecious and dioecious angiosperms.** *Nature*, London, 178(4532):552–553, Sept. 8, **1956.** 2 tables, 3 refs. **DWB**—The percentage "femaleness" of the flowers of *Mercurialis ambigua* decreased when photoperiod was increased from 8–24 hrs and when temperature was increased from 15.5–24°C. *Subject Headings:* **1. Bioclimatology of plants 2. Temperature effects.**—*C.E.P.B.*

8.2–282 551.586:612(98)

Edholm, O. G., **Physiology in the Polar regions.** *Nature*, London, 178(4540):954–956, Nov. 3, **1956. DWB**—Account of a discussion at British Association, Sept. 4, 1956. Papers were read on effects of 3 months darkness and light on habits of sleep and on physiological rhythms. In spite of "days" varying from 21 to 27 hours, excretory 24 hr rhythm persisted to a greater or less degree but body temperature rhythm quickly became adapted. Intake in winter varied from 1990–8760 calories/day, mean 3908, expenditure 2220–5890, mean 3510; body weight increased. On sledging journeys in spring calories balance was negative. Calorie balance of dogs was also described. There was fairly rapid adaptation to cold, shown by tactile sense of fingers and by amount of clothing. Plans for physiological observations on Trans-Antarctic Expedition were also described. *Subject Headings:* **1. Physiological climatology 2. Polar Regions.**—*C.E.P.B.*

8.2–283 551.586:612.2

Neuwirth, R., **Wetterempfindlichkeit und äussere Einflüsse auf physikalisch-chemische Systeme.** [Weather sensibility and external influences on physical-chemical systems.] *Angewandte Meteorologie*, 2(10):311–317, Oct. **1956.** 5 figs., 14 refs. **DLC**—Recent researches

have shown a relation between weather and variations of sickness, acting through the vegetative nervous system. This is discussed under: fermentation processes due to trace elements such as aran, permeability of cell walls, and intracellular colloid structure, especially the last, which is governed by rapid variations of scattered light due to a labile atmosphere. This is shown especially at the passage of a cold front. Flocculation of inorganic salts shows effect of approach of a depression. Change of height of 500 mb surface is also important. Cause is not yet known; infra-long-wave disturbances are not the immediate cause but are indicators. Corpuscular solar radiation has been suggested but author thinks complex weather changes set in action by the sun are more probable. *Subject Headings:* **1. Weather sensitivity 2. Bioclimatology.**—*C.E.P.B.*

8.2–284 551.586:612.5:551.585.53(688)

Wyndham, C. H. and Morrison, J. F., **Heat regulation of MaSarwa (Bushmen).** *Nature*, London, 178(4538):869–870, Oct. 20, **1956.** 2 tables, 5 refs. **DWB**—In the Kalahari Desert globe temperatures up to 140°F in the sun and 104°F in the shade are experienced. A number of physiological measurements were taken on 4 "wild" bushmen in a tent and compared with whites in London and Singapore. Bushmen in the natural state are as well adapted to heat stress as acclimatized Europeans. *Subject Headings:* **1. Desert bioclimatology 2. Body temperature 3. Kalahari.**—*C.E.P.B.*

8.2–285 551.586:616

Hentschel, Gerhard, **Die "meteorologische Ausgangslage" in ihrer Bedeutung für die Affizierung des Organismus.** [The "meteorological starting point" in its importance for effects on the organism.] *Angewandte Meteorologie*, 1(12):375–383, Dec. **1953.** 4 figs., 9 refs. **DLC**—Emphasizes the importance of basing investigations into atmospheric effects on health on regular observations under constant conditions. The diurnal variation of the vegetative nervous level (physical weakness, mental depression, sensitivity to pain) introduces an apparent meteorological effect. Indicating the meteorological situation by incoming radiation, after dark by cloud amount, organic reactions can be related to changing radiation conditions during, e.g., the passage of a depression. *Subject Heading:* **1. Bioclimatology.**—*C.E.P.B.*

8.2–286 551.586:633.88

Boss, G., **Der Einfluss von Klima und Witterung auf den Wirkstoffgehalt von Drogen.** [The influence of climate and weather on the effective content of drugs.] *Germany. Deutscher Wetterdienst in der US-Zone, Berichte*, No. 42:394–395, **1952.** **DWB**—Account of observations of yield of drugs from various plants as affected by weather. *Subject Headings:* **1. Drug plant yields 2. Climatic effects.**—*C.E.P.B.*

ENVIRONMENTAL INFLUENCES

See also: **Wind over land and water** (Rodewald), 8.2–178.

8.2–287 551.588.2:551.555

Horney, Günther, **Die Windverhältnisse im Gebiet des Würzburger neuen Hafens (Ein Beispiel für eine orographisch bedingte extreme Erhöhung der Windstärke auf kleinem Raum).** [Winds in the region of the new Harbor of Würzburg: an example of extreme intensification of wind strength in a small area due to orography.] *Meteorologische Rundschau*, 9(9/10):185–186, Sept./Oct. **1956.** fig., table. **DWB**—Winds from SW–NW show increased frequency, especially of strong gusts, due to channelling down the valley of the Main. Local variations of direction are plotted on a contour map. *Subject Headings:* **1. Topographic influences 2. Local winds 3. Main River, Germany.**—*C.E.P.B.*

8.2–288 551.588.6:628.1

Bleasdale, A., **Afforestation of catchment areas: the physicist's approach to problems of water loss from vegetation.** [Paper read to British Association, **1956.**] 9 p. table, 22 refs. Typescript. **GB-MO**—A review of the very complicated problem of the possible effect of

forests on water resources of an area. A combined aerodynamic and heat balance method such as that of H. L. PENMAN is favored as a basis. It is concluded that while the average effects over a large area are likely to be small, there may be large local gains or losses of moisture, with compensation spread over much larger areas. Suggestions are made for using the various factors to produce a general gain by selective planting in different zones. *Subject Heading:* **1. Forest effects on runoff.**—*C.E.P.B.*

8.2–289 551.588.6:628.1

Law, Frank, **The effect of afforestation upon the yield of water catchment areas.** Sheffield, British Association for the Advancement of Science, [1956]. 8 p. 2 tables, 14 refs. Mimeo. **GB-MO**—Owing to divergent opinions about effect of conifers on water supply, 10 gages were installed in a Sitka spruce plantation (1/9 acre) at Slaidburn, Yorkshire, with 3 outside and 3 on poles in the canopy. Rain down trunks and run-off from plot were also measured. Observations ran for 53 weeks. Rainfall was 38.76″, "throughfall" 24.13″. The figures are discussed in detail; it is concluded that run-off was decreased from 33 to 22″, or at the rate of 1 million gallons/day/1500 acres afforested. The cost of making this good over a large gathering ground would be considerable, but further experiments on a larger scale are recommended. *Subject Headings:* **1. Forest effects on runoff 2. Sitka spruce.**—*C.E.P.B.*

MISCELLANEOUS

COSMIC INFLUENCES

See also: **Sweep-frequency oblique-incidence experiments** (Möller), 8.2–117; **Meteor effect on twilight spectrum** (Jones), 8.2–152; **Eclipse effects on ionosphere** (Minnis), 8.2–309; **Eclipse effects on ionosphere** (Szendrei, McElhinny), 8.2–310.

8.2–290 551.590.21:551.501

van der Bijl, W., **Eine statistische Bemerkung zu Carmen Boute "Wirkungen elektrischer Felder und Strahlungen atmosphärischen und kosmischen Ursprungs auf das Wasser."** [A statistical comment on Carmen Boute "Effects of electric fields and radiations of atmospheric and cosmic origin on water."] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):477–479, **1956.** 2 tables, 2 refs., eqs. **DWB**—BOUTE's paper (*Archiv*, B7(1): 146–155, **1955**; *see* 7.5–233, May 1956, *MAB*) is criticized on the ground that successive observations are not independent and do not suffice to show a linear relation between effects at Brussels and Florence. *Subject Heading:* **1. Cosmic influences.**—*C.E.P.B.*

8.2–291 551.590.24:551.510.535

Minnis, C. M.; Bazzard, G. H. and Bevan, H. C., **Ionospheric changes associated with the solar event of 23 February 1956.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):233–234, Oct. **1956.** fig. **DWB**—At Singapore a very sudden increase in horizontal component of geomagnetic field and an increase of D layer absorption occurred at 0330 UT. At Inverness a small increase of absorption was possibly associated with a very large increase of cosmic ray intensity at 0345 UT. Little effect was observed on ionosphere at Slough. *Subject Heading:* **1. Eclipse effects on ionosphere.**—*C.E.P.B.*

8.2–292 551.590.24:551.510.535

Minnis, C. M., **The response of the ionosphere to the solar eclipse of 30 June 1954 in Great Britain.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):201–209, Oct. **1956.** 5 figs., 3 tables, 8 refs., 2 eqs. **DWB**—Vertical incidence measurements of critical frequency and virtual height of F2, F1 and E layers were made at Inverness and Slough (maximum obscuration 93 and 74%) every 3 min 6–18 h on June 25–July 5, 1954. From these a model was deduced of relative brightness (flux density) of sun's disk. It is concluded that 92% of the radiation was emitted from a uniformly radiating disk. The remainder was accounted for by doubling the radiation near the east and west limbs, while that from the poles was halved. These differences are due mainly to radiating and absorbing properties of the sun's atmosphere.

There was a considerable fall of electron density of F2 during the eclipse but probably no large change in the height or thickness of the layer. *Subject Heading:* **1. Eclipse effects on ionosphere.**—*C.E.P.B.*

8.2–293 551.590.25:621.396.9

Hines, C. O., **Diurnal variations in forward-scattered meteor signals.** *Journal of Atmospheric and Terrestrial Physics*, 9(4):229–232, Oct. **1956.** 3 figs., 7 refs. **DWB**—Predictions are made of diurnal variations of random meteor counts at Ottawa, over paths of about 1000 km, for various circuits over Canada. *Subject Heading:* **1. Meteor echoes.**—*C.E.P.B.*

8.2–294 551.590.25

Meteor trail [in] East Pacific Ocean. *Marine Observer*, 26(174):211, Oct. **1956.** fig. **DLC**—Ribbon-like trail visible for 10 min on Oct. 19, 1955. Deformation sketched. *Subject Heading:* **1. Meteor trails.**—*C.E.P.B.*

VISIBILITY

8.2–295 551.591.1

Hopkinson, R. G., **Light energy and brightness sensation.** *Nature*, London, 178(4541): 1065–1066, Nov. 10, **1956.** 4 refs. **DWB**—The apparent brightness of a patch of given luminance depends on the luminances of neighbouring parts of the field of vision as well as on the energy emitted by the patch. A new set of observations (adapting field 120°, luminous patch 2°) is analyzed. It is shown that at high adaptation levels brightness sensation is linearly related to physical luminance. *Subject Headings:* **1. Visibility of lights 2. Visibility theory.**—*C.E.P.B.*

OPTICAL PHENOMENA

See also: **Unusual frost points and dust haze** (Mackenzie), 8.2–209.

8.2–296 551.593.11

Abnormal refraction [in] Gulf of Aden, approach to Cape Town, [and in] Great Australian Bight. *Marine Observer*, 26(174):201–202, Oct. **1956.** 3 figs. **DLC**—Sketches of mirages on Nov. 1 and 10, 1955, in Gulf of Aden and Oct. 25, 1955, 12 mi S of Dassen Is. which appeared inverted above the actual island. *Subject Heading:* **1. Mirages.**—*C.E.P.B.*

8.2–297 551.593.11:551.524.7

Durst, C. S. and Bull, G. A., **An unusual refraction phenomenon seen from a high-flying aircraft.** *Meteorological Magazine*, London, 85(1010):237–242, Aug. **1956.** 5 figs., 2 refs. **DWB**—Flying at 45,000 ft above Ci at 40–42,000 ft on Nov. 29, 1955, a large rising cloud was seen, "like an atomic explosion," "white but turning yellow." Aircraft was above a shallow inversion at 44–45,000 ft. Attributed to an inverted mirage of a CuNb cloud with top at 25,000 ft, 200 mi away, caused by deflection of light in the inversion. A mirage of Greenland coast in 1820 was similar. Some reports of flying saucers seen from aircraft may be due to a similar effect. *Subject Headings:* **1. Mirages 2. Upper air inversions.**—*C.E.P.B.*

8.2–298 551.593.12:621.396.8:523.8:551.510.535

Wild, J. P. and Roberts, J. A., **Regions of the ionosphere responsible for radio star scintillation.** *Nature*, London, 178(4529):377–378, Aug. 18, **1956.** fig., 3 tables, 6 refs. **DWB**—Observations of scintillations of radio source in Cygnus A at 15° elevation from Dapto, N.S. Wales, 1952–55, showed nighttime correlation with spread F and daytime with sporadic E. Fluctuations were greatest at midnight in midwinter and noon in midsummer. At night only there is a W-E component of motion of 80 m/s across the ground, which is attributed to the effect of the earth's rotation on stationary irregularities at 500 km. *Subject Headings:* **1. Radio star scintillation 2. Ionospheric effects.**—*C.E.P.B.*

8.2–299 551.593.5/6

Volz, F., **Die Farben des Himmels. Dunst und Wetter.** [Sky colors: haze and weather.] *Umschau*, 56(19):593–596, Oct. 1, **1956.** 9 figs., 3 refs. **DLC**—This article, illustrated by

color photos, describes phenomena due to haze and cloud particles. The uniformly blue sky of fresh polar air (turbidity type A) gives place to a 40° white zone round the sun in type B and a red-brown zone in type C, which occurs especially after great volcanic eruptions and gives Bishop's Ring. The relation between distribution and wave-lengths of scattered light at different distances from the sun and the size distribution of aerosols (which in turn depend on weather) are shown by curves. Twilight phenomena and the purple light are described and illustrated. *Subject Heading:* **1. Sky colors.**—*C.E.P.B.*

8.2–300 551.593.51

Green flash [in] Eastern North Atlantic Ocean, Arabian Sea, Red Sea, Gulf of Aden [and] North Pacific Ocean. *Marine Observer*, 26(174):206–207, Oct. **1956.** fig. **DLC**—Eastern North Atlantic, green flash at sunset and again at setting of Venus. Arabian Sea, green flash at setting of Venus. Red Sea, sun set between 2 mountains with 3 successive green flashes. The others describe color variations. *Subject Heading:* **1. Green flash.**—*C.E.P.B.*

8.2–301 551.593.51:551.507.352

Majendie, A. M. A., **Green flash.** *Weather*, 11(11):372, Nov. **1956.** fig. **DWB**—Describes phenomena seen from an aircraft at 22,000 ft near Perigueux, France, at 0357 GMt June 19, 1956, above unbroken cloud. A brilliant green arc over the sun changed to a smaller bluish arc which turned into a white blob. Sketches are given. *Subject Heading:* **1. Green flash.**—*C.E.P.B.*

8.2–302 551.593.54:551.510.42:551.21

Bull, G. A. and James, D. G., **Dust in the stratosphere over western Britain on April 3 and 4, 1956.** *Meteorological Magazine*, London, 85(1012):293-297, Oct. **1956.** 3 figs., ref. **DWB**—Pilots' reports of "cloud" in the stratosphere are quoted. There was an eruption of Bezymannaya Sopka volcano in Kamchatka (55°57′N, 160°32′E) on March 30, with a cloud of ash to 20 km, and a lesser one on April 1. Contours of 100 mb surface are drawn for March 31 and April 2 and air trajectories traced. These show that the dust cloud originated in Kamchatka on March 30. *Subject Headings:* **1. Dust haze 2. Volcanic dust.**—*C.E.P.B.*

8.2–303 551.593.55

Deacon, E. L., **The second purple light.** *Nature*, London, 178(4535):688, Sept. 29, **1956.** 5 refs. **DWB**—Supports explanation by R. VON HELMHOLTZ (1883) and E. K. BIGG (1956) of the second purple light, which appears after the first and continues until 1½–2 hrs after sunset, as scattering from a dust layer at 81 km. It was very intense after Krakatoa eruption. *Subject Headings:* **1. Twilight phenomena 2. Purple light.**—*C.E.P.B.*

8.2–304 551.593.55:535.33 551.510.536

Wark, David Q., **A determination of the line-width of the λ6300 line of oxygen in the twilight sky.** *Nature*, London, 178(4535):689–691, Sept. 29, **1956.** 2 figs., table, 6 refs. **DWB**—Instrumentation, observations and reduction at College, Alaska, are described and curve of spectral intensity reproduced. The temperature of emission was about 750°K at >150 km, contrasting with 200°K of λ5577 line of oxygen at 100 km. *Subject Headings:* **1. Twilight spectra 2. Outer atmospheric structure.**—*C.E.P.B.*

8.2–305 551.593.63

Lunar halo [in] South Pacific Ocean, South China Sea [and] North Atlantic Ocean. Solar halo [in] New Zealand waters. South Pacific Ocean [and in] Indian Ocean. *Marine Observer*, 26(174):203–205, Oct. **1956.** 2 figs. **DLC**—A collection of unusual observations. In the S. Pacific two long vertical straight parallel lines were seen, one tangent to 22° halo. No explanation. In South China Sea the rare 23½° halo was seen without 22° halo. In North Atlantic, halo of 11½°. In 36°37′S, 176°44′W, solar corona radius 9°40′ and halos of 20° and 22°. In 29°55′S, 140°28′W, solar halo increasing in radius from 20°–24°. *Subject Heading:* **1. Halos.**—*C.E.P.B.*

8.2–306 551.593.64

Lunar corona [in] Indian Ocean. *Marine Observer*, 26(174):202–203, Oct. 1956. DLC — An abnormal corona on Oct. 23, 1955 (moon 1st quarter, altitude 75½°). A circular area of diameter 1½° was surrounded by a deep purple ring. *Subject Heading:* **1. Coronas.**—*C.E.P.B.*

ELECTRICAL PHENOMENA

See also: **Recombination coefficient in E-layer** (Omholt), 8.2-112; **Radio wave reflection in ionosphere** (Beynon, Thomas), 8.2–114.

8.2–307 551.594.11

Kasemir, H. W., **Zur Strömungstheorie des luftelektrischen Feldes III: der Austauschgenerator.** [On the current theory of the atmospheric electric field III: the austausch generator.] *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):357 370, 1956. fig., 15 refs., 7 eqs. German, English and French summaries p. 357–358. **DWB**—Autographic records of electric field and air-earth current at Buchau a.F., July–Sept., 1953, show a local increase 1-2 hrs after sunrise, especially on clear windless mornings. Possible explanations are examined, leading to the conclusion that there must be a local generator which strengthens the normal field and current and has its positive pole in the air. Transport of a positive charge upwards can be effected by austausch, accompanied by a steady release of positive ions at the earth's surface by an electrode effect. Observational evidence from literature is quoted which supports this interpretation. *Subject Heading:* **1. Potential gradient variations.**—*C.E.P.B.*

8.2–308 551.594.12:551.508.94:551.584.61

Dessauer, F.; Graffunder, W. and Laub, J., **Beobachtungen über Ionenschwankungen im Freien und in geschlossenen Räumen.** [Observations of ion variations in the open and in closed rooms.] *Annalen der Meteorologie*, Hamburg, 7(3/4):173–185, 1955/56. 6 figs., table. **DWB**—These observations with an ion transpirator were directed to measuring rapid variations rather than the absolute value of ion density. The apparatus is described with diagram and a number of records are reproduced. The ion count in the closed room was always greater than in the open. The quasiperiodicity of the fluctuations varied from 1 min to ½ sec. The difference is attributed partly to the smaller number of condensation nuclei and dust particles in the closed room, permitting a longer ion-life, partly to secondary gamma radiation from the walls and partly to shelter from ion-poor NW winds. *Subject Headings:* **1. Ion variations 2. Ion counters 3. Indoor air.**—*C.E.P.B.*

8.2–309 551.594.12:551.510.535:551.590.24

Minnis, C. M., **Interpretation of ionospheric measurements made during solar eclipses.** *Nature*, London, 178(4523):33–34, July 7, 1956. 3 refs. **DWB**—From eclipse measurements at Khartum and Ibadan in 1952 the value of α in the effective recombination coefficient ($\alpha \times 10^{-3} cm^3 s^{-1}$) is determined as 1.2, implying absence of any coronal radiation. *Subject Headings:* **1. Ion recombination 2. Solar eclipse effects.**—*C.E.P.B.*

8.2–310 551.594.12:551.510.535:551.590.24

Szendrei, M. E. and McElhinny, M. W., **Recombination and attachment in the F1 and F2 layers during the solar eclipse of 25 December 1954.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):118–130, Aug./Sept. 1956. 9 figs., 3 tables, 14 refs., 4 eqs. **DWB** — Ionosphere readings at 2½ min intervals at vertical incidence on 1.5–15 Mc/s were made at Grahamstown in the belt of annularity and compared with control readings. Mean variations of electron density at 20 km intervals, 160–280 km, are plotted against theoretical values under various assumptions as to removal of free electrons. It is concluded that removal is by recombination in F1 and recombination or attachment or both in F2. They are both caused by the same radiation, their separation being due either to a large decrease of recombination coefficient above F1 or to a change from recombination to attachment between F1 and F2. *Subject Headings:* **1. Ion recombination 2. F layer 3. Solar eclipse effects.**—*C.E.P.B.*

8.2–311 551.594.13:551.594.12

Sagalyn, Rita C. and Faucher, G. A., **Space and time variations of charged nuclei and electrical conductivity of the atmosphere.** *Royal Meteorological Society, Quarterly Journal*, 82(354):428–445, Oct. **1956.** 10 figs., 3 tables, 16 refs., 6 eqs. **Discussion.** *Ibid.*, 83(355):129–131, Jan. **1957. DWB**—Measurements of vertical distribution of large ions and electrical conductivity were made on 50 aircraft flights at 700-15,000 ft in fair weather, mainly over New Hampshire. In the exchange or friction layer 1000–10,000 ft deep, increasing from sunrise to 15 h, the distribution is determined by turbulence cycle. Diurnal variation is plotted and time variation on several days shown. With low advection regular changes of nucleus concentration in the exchange layer were due to coagulation and subsidence. In scattered clouds an increase and large horizontal variations were found. With intense advection at night variation was complicated. Changes of electrical conductivity are inverse of changes of nucleus concentration. Above the exchange layer nucleus content was low with no regular daily variation, and changes were usually less than 100 nuclei of one sign per cm^3 in 25 mi, and less than 10% of mean conductivity, but in the exchange layer large rapid fluctuations in space occurred. *Subject Headings:* **1. Nuclei height variations 2. Electrical conductivity of air.**—*C.E.P.B.*

8.2–312 551.594.2

Thunderbolts: The electrical phenomena of thunderstorms. *Meteorological Magazine*, London, 81(959):146–148, May **1952. DWB**—Account of geophysical discussion at Royal Astronomical Society Jan. 25, 1952. *Subject Headings:* **1. Lightning 2. Ball lightning.**—*C.E.P.B.*

8.2–313 551.594.21

Kuettner, Joachim, **The development and masking of charges in thunderstorms.** *Journal of Meteorology*, 13(5):456–470, Oct. **1956.** 3 figs., 27 refs., 59 eqs. **DWB**—Charge segregation is the link between charge generation and charge distribution in thunderstorms. The sedimentation process is described as masking rather than segregating charges. In the development of charges on solid precipitation in a supercooled cloud, charge is withdrawn from the cloud by precipitation falling through it, but after a "compensation period" of one or a few minutes determined by the size, shape and density of precipitation particles equilibrium is established at a fixed ratio of charges. If the updraft exceeds the falling speed of the precipitation, the precipitation charge predominates. At certain levels, especially the freezing and −40°C levels, the charging process ceases. An appendix discusses the types and rates of thunderstorm precipitation and their bearing on the compensation period. *Subject Heading:* **1. Thunderstorm electricity theory.**—*C.E.P.B.*

8.2–314 551.594.22:537.525

Jatar, D. P. and Sharma, H. D., **Threshold potential for the low-frequency electric discharge in air.** *Nature*, London, 178(4541):1073, Nov. 10, **1956.** fig., 5 refs. **DWB**—The threshold or sparking potentials for 50 c/s discharges in dry air at pressure 1–75 mm Hg in glass tubes with various electrodes are plotted as peak values against pressure×distance apart. *Subject Heading:* **1. Electrical discharges.**—*C.E.P.B.*

8.2–315 551.594.22

Wood, H. S., **Rare form of lightning [in] Arabian Sea.** *Marine Observer*, 22(158):194, Oct. **1952.** fig. **MH-BH**—A brilliant greenish explosion appeared behind a large Cu and a shaft of light shot up to 18°. *Subject Heading:* **1. Electrical discharges.**—*C.E.P.B.*

8.2–316 551.594.221:629.135

Alexander, L. L., **Three aircraft simultaneously struck by lightning.** *Meteorological Magazine*, London, 85(1010):246–248, Aug. **1956.** fig., table. Also: Hurst, G. W., **Aircraft struck by lightning.** *Ibid.*, p. 248–249. 2 photos. **DWB**—April 16, 1956, 3 Valiant aircraft at 3000 ft in a CuNb near Grimsby each experienced a violent bump and vivid flash, no damage. There was no other thunderstorm over a wide area and the large metal aircraft may themselves have caused it. On Jan. 18, 1956, a Varsity aircraft was struck at 8000 ft off Cape Finisterre.

Equipment became unserviceable, aerial was burnt off, skin buckled and pierced in 3 places. *Subject Headings:* **1. Lightning strokes on airplanes.**—*C.E.P.B.*

8.2–317 551.594.221:550.385

Das, A. K., **Effect of lightning discharges on magnetographs.** *Nature*, London, 178(4537): 815, Oct. 13, **1956.** ref. **DWB**—Minor oscillations like those recorded at Alibag (*Nature*, 176:876, 1955) frequently occur on the La Cour magnetographs at Kodaikanal during thunderstorms. They are attributed to short-duration electric currents accompanying lightning strokes. They are smaller on the more highly damped Watson magnetographs. *Subject Headings:* **1. Geomagnetic disturbances 2. Lightning strokes.**—*C.E.P.B.*

8.2–318 551.594.221

Hepburn, F., **Man's study of lightning.** *Science Progress*, London, 44(176):635 646, Oct. **1956.** 7 refs. **DLC**—The ancients regarded lightning as manifestations of the wrath of Jove. In the Middle Ages church bells were rung as a preventive -and many bell-ringers were killed. FRANKLIN's theory of the lightning rod and the subsequent controversy "knobs vs points" are described. Summaries are given of the light thrown on lightning discharges by GALVANI's experiments, Boys' camera etc. Subsequent discoveries led to the result that an average return stroke builds up to 30,000 amp in 6 millionths of a second, and an active thunderstorm dissipates about 50 MW. Radio-location of thunderstorms and the use of lightning flashes in ionospheric investigation are mentioned. *Subject Heading:* **1. Lightning research.**—*C.E.P.B.*

8.2–319 551.594.221:537:92

Schonland, B. F. J., **Benjamin Franklin: natural philosopher.** *Royal Society of London, Proceedings, Ser. A*, 235(1203):433–444, June 12, **1956.** portrait, plate, 16 refs. **DWB**—Lecture on the 250th anniversary of FRANKLIN's birth (Jan. 17, 1706). After running rapidly over his earlier scientific life, it deals fully with his experimental and theoretical work in electricity which began in 1746 and continued for 7 8 years. Study of lightning and electrification of thunderclouds began in 1749. The lightning rod controversy (knobs vs points) is fully described, including the part played by B. WILSON. The great value of the lightning rod is emphasized. *Subject Headings:* **1. Biography 2. Franklin, B.**—*C.E.P.B.*

8.2–320 551.594.223

Malsch, W., **Beobachtung eines Kugelblitzes.** [Observation of ball lightning.] *Meteorologische Rundschau*, 9(9/10):188, Sept./Oct. **1956.** **DWB**—Ball lightning entered a house at Hödingen on May 10, 1952. Accompanying phenomena are described. *Subject Heading:* **1. Ball lightning.**—*C.E.P.B.*

8.2–321 551.594.223

Wolf, Franz, **Interessante Aufnahme eines Kugelblitzes.** [Interesting photo of ball lightning.] *Naturwissenschaften*, 43(18):415–417, Sept. 15, **1956.** 2 figs., 10 refs. **DWB**—W. JÄCK exposed a camera for 4 min in a room at night during a thunderstorm at Ittersbach, and obtained a photo which is reproduced. It shows a very erratic light track which is considered to represent ball lightning about 3 m from the lens. JÄCK was not present during the occurrence. *Subject Heading:* **1. Ball lightning.**—*C.E.P.B.*

AURORAS

See also: **Auroral radiation measurement** (Ashburn), 8.2–148.

8.2–322 551.594.5

Paton, J., **The polar aurora.** *Royal Meteorological Society, Quarterly Journal*, 82(354):396–408, Oct. **1956.** 6 figs., 43 refs. **DWB**—This Symons Memorial Lecture first summarizes the history of observation and theory, culminating in the work of K. BIRKELAND and C. STÖRMER. Relations to the ionosphere, solar emissions and magnetic storms are next discussed. "The accumulating evidence is that every great aurora has its origin in an intense flare" through a

corpuscular stream. Auroral spectra and the processes which produce them are described. The more recent theories of aurora are based on a neutral solar stream of ions and electrons, but the mechanism is still obscure. Additional exact observations are needed and are in progress; they will be intensified during the International Geophysical Year. *Subject Headings:* **1. Auroras 2. Auroral-solar relationships.**—*C.E.P.B.*

8.2–323 551.594.52

Harang, L., **Height distribution of auroral emissions.** *Journal of Atmospheric and Terrestrial Physics*, 9(2/3):157–159, Aug./Sept. **1956.** fig., 3 refs., 2 eqs. **DWB**—Height distributions of luminosity with a photometer are plotted. The decrease above the max at 100 km was much more rapid on 5577 and 4278 (O I lines) than on 6300 and 6450. The slope of the ratios indicates a linear decrease with height of collisional deactivation of the *D* state. *Subject Heading:* **1. Auroral heights.**—*C.E.P.B.*

8.2–324 551.594.52(99)

Sandner, Werner, **Polarlicht-Häufigkeit in Antarktika.** [Auroral frequency in Antarctica.] *Forschungen und Fortschritte*, 30(10):297–298, Oct. **1956.** table. **DLC**—Annual variation in Adélie Land (67°S, 141–140°E) Feb. 1950–Sept. 1952 is compared with New Zealand 1931–42. Antarctic frequency is naturally zero in summer, highest in May (14.3) and Sept. (10.3), compared with New Zealand maxima in Oct. (8.1) and March (7.1). There are periodicities of 27 and 57 days. *Subject Headings:* **1. Auroral frequencies 2. Antarctica.** —*C.E.P.B.*

SFERICS

8.2–325 551.594.6

Allcock, G. McK. and Martin, L. H., **Simultaneous occurrence of "dawn chorus" at places 600 km. apart.** *Nature*, London, 178(4539):937–938, Oct. 27, **1956.** 3 figs., 3 refs. **DWB** -Observations on 273 simultaneous schedules at Wellington and Dunedin, 600 km apart on a geomagnetic meridian, show groups of whistlers on 106 occasions at Wellington and 64 at Dunedin, 56 being simultaneous within 0.1 sec. Variations with signal strength are shown; the wave range is less than an octave. *Subject Heading:* **1. Sferics.**—*C.E.P.B.*

ACOUSTICAL PHENOMENA

8.2–326 551.596.1

Kästner, Siegfried, **Das Reflexionsvermögen und die Durchlässigkeit eines Schichtsystems visko-elastischer Medien bei Einfall einer ebenen Schallwelle unter beliebigem Winkel.** [Reflection possibilities and transparency of a stratified system of visco-elastic media on which a flat sound wave falls at a given angle.] *Annalen der Physik*, 6 Ser., 18(3/4): 190–219, **1956.** 2 figs., 2 tables, footnote refs., 158 eqs. **DLC**—Propagation of compression and shear sound waves in an unlimited visco-elastic medium differs from that in a purely elastic medium in that they become inhomogeneous and elliptically polarized. Propagation in a plane stratified medium is next considered; if the chain matrix of the system is known, the reflected and transmitted waves can be deduced as a function of the incident wave. *Subject Heading:* **1. Acoustical propagation.**—*C.E.P.B.*

PART II. A SELECTIVE ANNOTATED BIBLIOGRAPHY ON NIGHT AIRGLOW

By: *Mary L. Rice*

INTRODUCTION

Since the early 1900's, the intensity, variation and composition of the light of the night sky have been studied systematically in order to determine its essential characteristics and to discover its probable origin. The results of such studies and analogous studies of the aurora have added immeasurably to the knowledge of the physics and chemistry of the upper regions of the atmosphere.

We have limited this bibliography to a selection of recent papers dealing chiefly with the night airglow (sometimes called the nonpolar or permanent aurora), which makes up 40% of all light of the night sky. Papers on other types of airglow (twilight and day) and other types of light of the night sky (gegenschein and galactic light) have, accordingly, been omitted.

The majority of the papers selected for inclusion here were written after 1945. Excellent summaries of progress in the investigation of night airglow, made in the earlier years, will be found by consulting DEJARDIN (*see* 8B–11), FRONGIA (*see* 8B–18), and ELVEY and FARNSWORTH (*see* 8B–19). Extensive bibliographies accompany these three papers.

The **Subject Outline** indicates the scope of the topics covered in the various papers and the **Geographic Outline** indicates places where extensive observations have been made.

As in the case of the two bibliographies on the Aurora (Vol. 4, No. 10, Oct. 1953 and Vol. 5, No. 3, March 1954, *MAB*), we appreciate the use of the extensive reference file of E. V. ASHBURN, Naval Ordnance Testing Station, Inyokern, Calif.

OUTLINE OF CONTENTS

SUBJECT OUTLINE

GENERAL
- **Conferences and Symposia,** 8B–32, –133
- **Bibliographies,** 8B–73, –87, –97, –128
- **Manuals,** 8B–160
- **Textbooks,** 8B–34

THEORY
- **Excitation processes**
  - Recombination, 8B–13, –35, –50, –131, –152
  - Ionized layers, 8B–50
  - Incident particles, 8B–23, –50
  - Corpuscular streams from the sun, 8B–60
  - Electrical discharge, 8B–112
- **Theory of**
  - Chapman, 8B–13, –23
  - Elvey, 8B–23
  - Krasovskiĭ, 8B–152
  - Nicolet, 8B–35
  - Roach, 8B–112
  - Yonezawa, 8B–60

INSTRUMENTS AND EQUIPMENT
- **Birefringent filters,** 8B–144, –151
- **Photometers,** 8B–151, –161
  - Fesenkov, 8B–83
  - Roach, 8B–85, –93
  - Photoelectric, 8B–138, –145
  - Recording, 8B–46, –78, –144
- **Polariscope,** 8B–25
- **Fabry-Perot interferometer,** 8B–135, –142, –148, –159
- **Spectrographs**
  - Diffraction grating, 8B–123
  - Recording, 8B–143
- **Rockets,** 8B–139, –150, –158

METHODS OF MEASUREMENT OF INTENSITY AND HEIGHT
- **Photometric,** 8B–1, –5, –40, –49, –61, –66, –81, –116, –128, –138, –144, –157, –160, –161
  - Visual, 8B–9, –30, –59
  - Photographic, 8B–143
  - Photoelectric photometric, 8B–16, –65, –108, –145
- **Van Rhijn method,** 8B–126, –137, –145
- **Triangulation,** 8B–137, –147
- **Rockets,** 8B–139, –150, –158

VARIATIONS IN NIGHT SKY RADIATION, 8B–20, –38, –50, –76, –111, –138, –157
- **Diurnal,** 8B–9, –12, –15, –16, –29, –36, –42, –55, –66, –74, –79, –81, –86, –88, –89, –92, –110, –112 to –114, –125, –128, –131, –134, –140, –141
- **Annual,** 8B–6, –15 to –18, –29, –42, –55, –74, –79, –81, –86, –90, –92, –110, –115, –128, –140

Long period, 8B–23
Latitude, 8B–23, –39, –42, –44, –111, –125
Height (of emitting layers), 8B–3, –23, –28, –36, –37, –39, –42, –50, –54, –58, –59, –61, –68, –72, –76, –77, –79, –85, –86, –89, –91, –92, –97, –100, –103, –116, –118, –124, –126, –127, –130, –137, –139, –145, –147, –158
PHYSICAL PROPERTIES
Temperature, 8B–94, –97, –148, –159
Polarization, 8B–25, –27, –43
Width of spectral line, 8B–159
Color, 8B–16, –27
SPECTRAL ANALYSIS, 8B–11, –20, –38, –42, –87, –106
Bands (molecular), 8B–26
CO (Cameron), 8B–22, –76
H_2O, 8B–22, –76
N_2 (Vegard-Kaplan), 8B–7, –61, –76, –80, –105
N_2, 8B–105
NA doublet, 8B–85, –96, –107, –125, –150
NO, 8B–105
Oxygen, 8B–85
Lines (atomic), 8B–109, –110
A, 8B–3
HE, 8B–3
N, 8B–3
O, 8B–3
[OI], 8B–2, –10, –38, –51, –119, –125, –131, –135, –139, –142
Wave Lengths of Bands and Lines
Ultraviolet Region—3000 Å to 4000 Å
3019 Å, 8B–8
3914 Å, 8B–94
Visible Region—4000 Å to 7000 Å
4168 Å, 8B–1
4173 Å, 8B–6
4278 Å, 8B–94
4419 Å, 8B–1
4420 Å, 8B–6
5000 Å, 8B–93
5577 Å, 8B–12, –15, –29, –39, –45, –55, –66, –88 to –90, –93, –110, –112, –113, –119, –124, –126, –127, –131, –139, –141, –144 to –147, –149, –157, –159
5888 Å, 8B–12, –15
5890 Å, 8B–141, –144
5892 Å, 8B–29, –119
5893, 8B–45, –185, –110, –126
6300,8Å 8B–12, –15, –29, –39, –45, –119, –126, –127, –141, –144, –159
6361.4± Å, 8B–5
6361.7 Å, 8B–5
Near Infrared Region—7000 Å to 11000 Å
7200 to 10,440 Å, 8B–26
7500 to 9000 Å, 8B–41
ASSOCIATED PHENOMENA
Ionosphere, 8B–131
Čerenkov radiation, 8B–24, –101, –121
Cosmic radiation, 8B–24, –69, –101
Diffuse radiation, 8B–104
Solar radiation, 8B–69
Thunderstorms, 8B–53
Auroras, 8B–19, –35 to –37, –44, –53, –111
Twilight, 8B–27, –34, –53, –65, –84, –95, –107, –114
Eclipses, 8B–149
Magnetic activity, 8B–35, –75
Meteoric dust, 8B–54
Sunspots, 8B–110, –128

GEOGRAPHIC OUTLINE

NORTH AMERICA
Alaska
College, 8B–49, –59
Canada
Saskatoon, 8B–44, –122
United States
Arizona
Flagstaff, 8B–2
California
Cactus Peak, 8B–51, –88, –89, –90, –110, –111, –126, –131
Mojave Desert, 8B–74
Colorado
Fairplay, 8B–149
Maryland
Washington Grove, 8B–53, –84
New England, 8B–19
New Mexico
Sacramento Peak, 8B–111, –113, –125, –144, –157
White Sands, 8B–139, –150
Texas
McDonald Observatory, Fort Davis, 8B–19, –45
Washington, D. C., 8B–53, –65
SOUTH AMERICA
Argentina
Bosque Alegre, 8B–19
Chile
Potrerillos, 8B–19
EUROPE
England
Essex, 8B–1
France
Haute Provence Observatory, 8B–29, –78, –79, –89, –92, –116
Lyon Observatory, 8B–29
Pic du Midi Observatory, 8B–3, –36, –121
Germany
Göttingen, 8B–2
Tübingen, 8B–75
U.S.S.R., 8B–154
Caucasus, 8B–9
Crimea, 8B–64
ASIA
Japan, 8B–124
Kazakh, SSSR.
Alma Ata, 8B–40
AFRICA
Algeria
Tamanrasset, 8B–36
Belgian Congo
Biano Katanga, 8B–85
Union of South Africa
Panfontein, 8B–85

1931–1934

8B–1 551.521.326 551.594.5

Rayleigh, (Robert John Strutt) Lord, **On a night sky of exceptional brightness, and on the distinction between the polar aurora and night sky.** *Royal Society of London, Proceedings, Ser. A* 131(817):376–381, May **1931.** plate, table, refs. **DLC**—An exceptionally bright night sky on Nov. 8, 1929, is described, with photometric observations. It was of about four times the ordinary brightness, and eight times the minimum ever observed. It was of the same chromatic constitution as usual and the aurora line was not conspicuous. There was no accompanying magnetic disturbance. This is contrasted in detail with the aurora of May 14, 1921. Spectra of the aurora and of the normal night sky are reproduced for comparison. Nitrogen bands are absent in the latter. Two unidentified bright lines in the night sky spectrum are remeasured. The wave lengths found are 4419 and 4168. (*Same item as* 4J–77, Oct. 1953, *MAB.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. Essex, Eng.**—*Author's abstract.*

8B–2 551.521.326

Sommer, L. A., **Über den langwelligen Teil des sichtbaren Spektrums des Nachthimmellichtes.** [Long-wave part of the visible spectrum of light from the night sky.] *Zeitschrift für Physik*, 77(5/6): 374–390, Aug. 2, **1932.** 2 figs., 7 tables, numerous refs., eq. **DLC**—Observations were made in 1928–1929 at Göttingen, Flagstaff (Ariz.) and Pasadena, the latter being more suitable places, with an extremely well-illuminated spectrograph of the very weak light from the night sky. Lines and bands were identified as those due to O, O_2 and H_2O. The lines of the [OI] spectrum correspond to the transition between the deep-seated metastable terms $^2p^3p_{210}$, $^2p^1D_2$ and $^2p^1S_0$. The bands of the O_2 spectrum were indicated as quadripole radiation between the deep-seated metastable electron terms $^3\Sigma_g^-$, $^1\Delta_g$ and $^1\Sigma_g^+$ of the spectrum in a similar way to the coordination of quadripole radiation between the deep-seated metastable terms ^3P, ^1D and ^1S of the spectrum of [OI] and the spectrum transition $^3\Sigma_g^-$, to $^1\Sigma_g^+$. This classification is supported by (1) the agreement of long-wave structure between the emission bands observed here and the atmospheric absorption bands of O_2, (2) the very low absorption coefficient of atmospheric O_2 bands and the quadripole radiation of O_1, (3) the difficulty of excitation of this radiation of O_2 and 01 in emission, and (4) the low excitation potential, 4.17 volts for $^1S_0$ of 01 and 1.62 volts for $^1\Sigma_g^+$ of O_2. The H_2O bands are indicated as due to Fraunhofer spectrum are identical with those emission lines in the spectrum of the light from the night sky, the solar radiation absorbed by the atmosphere being thus emitted at night. The maximum excitation of the bands was interpreted as radiation products associated with the nocturnal decrease of O_3 in the upper atmospheric layer in which the night sky functions as 50 km. Comparison of measurements of wave-length with the long-wave part of the auroral spectrum gives agreement of the wave-length structure but large deviations of intensity. The interpretation of the long-wave spectrum of light from the night sky includes an analysis of the corresponding auroral spectrum. *Subject Headings:* **1. Night airglow spectrum 2. Long wave spectrum of night airglow.**—*Physics Abstracts, No. 4982, 1932.*

8B–3 551.521.326:551.508:535.33

Cabannes, J. and Dufay, J., **Analyse spectrale de la lumière du ciel nocturne au Pic du Midi.** [Spectral analysis of night airglow at Pic du Midi.] *Académie des Sciences, Paris, Comptes Rendus*, 198:306–309, Jan. 22, **1934.** **DLC**—Using a more sensitive spectrograph, the authors have reduced the exposure necessary to photograph the spectrum of the night sky. A table of 91 lines, 44 new (of which 31 are regarded as certain), is given and analyzed. In addition to N and O, He and many A lines are identified. The principal unidentified lines of cometary nuclei are all very near lines measured by the authors. The intensity of the continuous spectrum for different parts of the sky was compared by a reflecting prism; it was greater for the zenith than for the south horizon but still greater for the north horizon. The discontinuous spectrum was always greater for horizon than for zenith. The altitude of the luminous regions is estimated at upwards of 100 km. *Subject Headings:* **1. Night airglow spectrum 2. Night sky spectroscopy 3. Pic du Midi Observatory, France.**—*Physics Abstracts, No. 1527, 1934.*

1935

8B–4 551.521.326

Cabannes, J. and Dufay, J., **Les bandes de Vegard-Kaplan dans le spectre du ciel nocturne.** [Vegard-Kaplan bands in the night sky spectrum.] *Académie des Sciences, Paris, Comptes Rendus*, 200:1504–1506, April 29, **1935.** **DLC**—The authors observed this complicated emission spectrum during 1933 Aug. to 1935 Feb.; the most intense and characteristic features being those discovered by Rayleigh at 4435 and 4220 Å, and by Kaplan attributed to molecule-nitrogen found in the laboratory by himself and Vegard. A diagram and table indicate that the 6 bands of Vegard-Kaplan can be recognized in the most intense sky radiation. The A→X bands can also be recognized

in the polar aurora; the bands of the 2nd positive system of N^2 and those of the negative system of N^2_+ are intense and mask certain of these bands. The presence of the first positive system of Nitrogen bands shows that a great number of N molecules in the upper atmosphere is long, but with the rarity of molecular collisions in the upper air, spontaneous returns to normal state of the forbidden lines $A \rightarrow X$ become possible. An analogous phenomenon has been found by BOWEN for nebulae and by MCLENNAN for the aurora and night sky in the forbidden lines 5577 and 6303 Å, of atomic oxygen. *Subject Headings:* **1. Night sky spectrum 2. Vegard-Kaplan bands.**—*Physics Abstracts, No. 2482, 1935.*

8B–5 551.521.326:535.243

Cabannes, J., **Les raies rouges de l'oxygène dans le spectre du ciel nocturne.** [Red lines of oxygen in the night airglow spectrum.] *Académie des Sciences, Paris, Comptes Rendus*, 200:1905–1908, June 3, **1935. DLC**—The presence of the O red triplet $^1S_0 \rightarrow {}^3P_{0,1,2}$ in the night sky spectrum has not hitherto been clearly established. On a spectrogram obtained in an $8\frac{1}{2}$ hr exposure the first component is remarkably strong and is measured as $\lambda 6301 \cdot 4 \pm 0 \cdot 6$; the second component is measured less precisely as $\lambda 6361 \cdot 7$; the third is not detectable. Ten previously observed bands are measured. The strongest has two components. From photometric results it is concluded that two-thirds of the oxygen in the luminescent layer at 200–300 km in the upper atmosphere is atomic, and that there are three times as many unexcited N_2 molecules as unexcited O atoms. Small numbers of these are excited electronically to metastable states $A\,^3\Sigma$ and $^1S_0$, the upper states for the N_2 Vegard-Kaplan bands and the O line $\lambda 5577$. Intensity variations of $\lambda 6301$ are due to the presence of low-energy electrons which excite O to $^1D_2$ only. *Subject Headings:* **1. Night airglow spectrum 2. Oxygen bands 3. Night sky spectrophotometry.**—*Physics Abstracts, No. 3383, 1935,*

8B–6 551.521.326

Cabannes, J. and Dufay, J., **Variation annuelle de l'intensité des raies brillantes du ciel nocturne.** [Annual intensity variation of luminous bands in the night sky.] *Académie des Sciences, Paris, Comptes Rendus*, 200:878–880, March 11, **1935. DLC**—The spectrograph now used by the authors gives in about six hours a spectrum of the northern night-sky sufficiently dense for microphotometric separation of line intensities from the continuous spectrum. 68 spectrograms covering fourteen months show a parallel variation, apparently annual, in the line 4173 and the 4420 group; the variations are about three-fold and exceed the erratic changes from night to night quite considerably. Maxima occur in March and Aug. A minimum in May is less intense than that in Jan. The curve runs parallel to that of aurora frequency, is similar to that of general night-sky brilliance (with a difference possible due to greater intensity of the continuous spectrum in summer), and is comparable with RAYLEIGH's observations on the 5577 green line. *Subject Headings:* **1. Night sky spectra variation 2. Annual emission spectra variations.**—*Physics Abstracts, No. 2031, 1935.*

1936

8B–7 551.521.326:546.21

Cabannes, J. and Dufay, J., **Peut-on identifier certaines radiations du ciel nocturne avec des bandes Schumann-Runge de la molecule d'oxygène?** [Can certain radiations in the night sky spectrum be identified with Schumann-Runge O_2 bands?] *Académie des Sciences, Paris, Comptes Rendus*, 202(5):365–367, Feb. 5, **1936.** refs. **DLC**—The strongest Vegard-Kaplan N_2 bands in the night sky have $v' = 2, 3, 4$. If the Schumann-Runge O_2 bands are present and are excited by the same electrons, the strongest of them will have $v' = 6$ to 10 and $v'' = 20$, and will form groups near $\lambda\lambda 3960, 4045, 4135, 4220, 4315, 4415, 4505, 4615$. The night-sky spectrograms of relatively large dispersion (one of which is reproduced with the above positions marked) show radiations at $\lambda\lambda 3872, 4127, 4371, 4407, 4457, 4514, 4675, 4707, 4711, 4816, 4823, 4904$, whose emitters are unknown. There are several approximate concordances, indicating the probable presence of the O_2 bands. Consideration of the energy-limits of the exciting electrons indicated by the Vegard-Kaplan N_2 bands, and of the potential energies and internuclear distances of O_2 molecules in the $X\,^3\Sigma$ and $B\,^3\Sigma$ states, shows that the Schumann-Runge bands, if present, will have about 1/15 of the intensity of the Vegard-Kaplan bands and will be very difficult to detect. *Subject Headings:* **1. Night airglow spectrum 2. Molecular oxygen bands.**—*Physics Abstracts, No. 1573, 1936.*

8B–8 551.521.326

Cabannes, J.; Dufay, J. and Gauzit, J., **Sur la presence de radiations de longueurs d'onde inférieures à 3000 Å dans le spectre du ciel nocturne et l'existence probable de deux conches luminescentes dans la haute atmosphère.** [Radiations beyond 3000 Å in the night-sky spectrum; probable existence of two luminescent layers in the upper atmosphere.] *Académie des Sciences, Paris, Comptes Rendus*, 202(8):612 614, Feb. 24, **1936.** refs. **DLC**—At the short-λ end of the night-sky spectrum, where O_3 absorption is considerable, three emission lines are observed at $\lambda\lambda 3019$

(strong), 2969 (weak and somewhat doubtful) and 2958 (fairly strong). It is supposed that they originate in the same region of the O_3 layer. λ2958 and λ2969 are identified as the O lines $^1S_0 \rightarrow {}^3P_2$ and $^1S_0 \rightarrow {}^3P_1$, which are expected in the night sky from the presence of $^1S_0 \rightarrow {}^1D_2$ (λ5577) and whose calculated $\lambda\lambda$ are 2958.3 and 2972.4. There are probably two luminescent layers, the higher one being excited directly by electronic collision and the lower one being due to transitions accompanying the formation or the destruction of O_3. The metastable $^1S_0$ atoms of O result from the decomposition of O_3: $-O_3 \rightarrow O_2\ (^1\Sigma) + O(S_0)$. Recent observations of the periodic variations of the brightness of the night sky are explained on this hypothesis. *Subject Headings:* **1. Night airglow spectrum 2. Luminescent layers.**—*Physics Abstracts.*

8B–9 551.521.326(479)

Cherniaev, V. I.; Khvostikov, I. A. and K. B. Panschin, **Repartition de l'énergie dans les spectres de la lumière du ciel nocturne aux differentes heures de la nuit.** [Energy distribution in night sky spectrum at different hours of the night.] *Journal de Physique et le Radium*, 7(3):149–152, March **1936.** 3 tables, 4 figs., 5 refs. **DLC**—The threshold method of visual perception was used in the Caucasus to obtain with a monochromator the nocturnal variation of intensity of the light. The apparatus used is described. Tests were made over the range 4550 to 5900 Å with six series of observations each night. The results are tabulated and shown graphically. It is found that the spectral composition and intensity both vary during the night. The effects are subdivided between (1) energy from stars assuming a blackbody temperature of 5500° Abs, and having a constant value, (2) diffused solar light from the upper atmosphere layers which from King's curves has a constant value, and (3) nocturnal diffusion over the range 5300–5900 Å. The results are tabulated and the absolute intensity of the green ray is found. The latter is near to, but smaller than, RAYLEIGH's value. *Subject Headings:* **1. Night airglow intensity variations 2. Caucasas, U.S.S.R.**—*Physics Abstracts, No. 2105, 1936.*

8B–10 551.524.7:551.521.326

Das, A. K., **On the temperature of the earth's outer atmosphere and the forbidden OI lines of the night-sky spectrum.** *Beiträge zur Geophysik*, 47(1/2):136–148, **1936.** fig., foot-refs., 5 eqs. **DLC**—After referring to various methods of estimating the high temperatures of the outer atmosphere, the author in the present paper proposes to indicate a possible connection between these high temperatures and the presence of neutral atomic O. From a theoretical consideration he finds that if the neutral O atoms in the high atmosphere absorbed selectively from the solar spectrum the lines 2972, 5577, 6364 Å, and the energy absorbed was converted into thermal energy, the temperature should be in the neighborhood of 2000 Å. At night the value would be about 1000 Å. The intensity of the green line calculated from the temperature deduced from the suggested mechanism agrees well with the observed intensity. The author concludes that this process of selective absorption and emission by the neutral O atoms offers an explanation of the high temperatures and of the emission of the green line with intensity decreasing towards midnight as observed. The paper concludes with a discussion of the two assumptions made. *Subject Headings:* **1. Upper air temperatures 2. Night airglow spectrum 3. Atomic oxygen.**—*Physics Abstracts, No. 3557, 1936.*

8B–11 551.521.326

†Dejardin, Georges, (*Univ. of Lyons*), **The light of the night sky.** *Reviews of Modern Physics*, 8(1):1–21, Jan. **1936.** 15 figs. (incl. photos), 63 foot-refs. **DLC**—Theoretical and experimental investigations of night airglow between 1910 and 1935 are summarized under the following topics: 1) measurement of night sky brightness, 2) measurement of its polarization, 3) spectral analysis for the range λ10,000 to Å2963, 4) night and seasonal airglow variations as observed at stations in different latitudes, theories of origin (continuous spectrum, selective emission spectra) and recent attempts to reproduce aurora and night airglow spectra in the laboratory. A fairly extensive list of references (without titles) is included. *Subject Headings:* **1. Night airglow brightness 2. Spectral analysis of night airglow.**—*M.L.R.*

8B–12 551.521.326:535.243

Garrigue, H., **Noveaux résultats sur la lumière du ciel nocturne.** [Recent results on light of night airglow] *Académie de Sciences, Paris, Compes Rendus*, 202(21):1807-1809, May 25, **1936. DLC**—Results of examination of microphotometer records of 163 night-sky spectrograms obtained with a wide aperture instrument are as follows: The red line, λ6300, emission of which is apparently due to action of solar radiation, diminishes in intensity after twilight, fluctuates rapidly during the night and increases before dawn; its midnight mean intensity varies little from night to night; it is 2 to 5 times as strong at horizon as at zenith. The yellow band, λ5888, fluctuates rapidly in intensity in the course of a night, but its mean intensity varies little from one night to another and shows no diurnal change; it is 2 to 3 times as intense at horizon as at zenith. The green line, λ5577, increases in intensity from twilight until about 1 a.m. and then diminishes until dawn,

fluctuating rapidly through out; its mean intensity varies little from night to night and is 2·4 times as great at horizon as at zenith. The backgrounds in these three regions are comparable in intensity from one night to another, except at twilight and dawn. *Subject Headings:* **1. Night airglow intensity variations 2. Spectrophotometric observations.**—*Physics Abstracts, No.* 3565, 1936.

1937

8B–13 551.521.326 551.594.51

Chapman, Sydney, **On the production of auroral and night-sky light.** *London, Edinburgh, and Dublin Philosophical Magazine and Journal of Science,* 7th Ser., 23(156):657–665, April **1937.** refs. **DLC**—Advances a theory of the production of night sky light. Energy involved is originally derived from sunlight being stored as during the day mainly in the form of dissociation of O_2 molecules. Author outlines ways in which the different observed lines and bands of the night sky spectrum could be excited by the recombination of O atoms, the third particle necessarily participating being a nitrogen molecule or another oxygen atom and more probably the former. The auroral spectrum, on the other hand, is attributed to strong excitation by impact due to high speed particles, whether ions or electrons, entering the atmosphere from outside. The presence of lines of atomic N is considered to be very doubtful. *Subject Headings:* **1. Night airglow theories 2. Auroral theories.**—*Physics Abstracts, No.* 2014, 1937.

8B–14 551.521.326

Das, A. K., **Mechanism of emission of the forbidden lines of neutral atomic oxygen by the night sky.** *Beiträge zur Geophysik,* 49(3):241–251, **1937.** foot-refs., 18 eqs. **DLC**—In a previous paper (*see* 8B–10), the author has outlined a tentative theory of the high temperature of the earth's outer atmosphere on the assumption that neutral atomic O, which probably forms the principal constituent of the atmosphere between the 100 km and 200 km levels, absorbs out of the solar and stellar radiation the forbidden lines λ2972, λ5577, λ6300 and λ6364 and attains a high equilibrium temperature at which the absorbed radiations can be re-emitted. It has been shown also that the theoretically calculated temperature and the rate of emission of the green line of the night sky agree well with the experimentally known values. In the present paper certain points which were implicit in the method of calculation employed in the previous paper have been explicitly brought out, and it has been found from quite general principles of quantum theory that on account of the special conditions of density existing in the region of the atmosphere concerned and on account of the metastability of the 1 S and 1 D states of the neutral O atom the atomic O layer should be expected to attain a thermally steady state which can be taken to be that of thermodynamical equilibrium. The emission of the forbidden OI lines by the night sky appears, according to the present theory, to be a case of fluorescence under the influence of dilute temperature radiation. *Subject Headings:* **1. Forbidden [OI] lines 2. Night airglow emission.**—*Physics Abstracts, No.* 1586, 1937.

8B–15 551.521.326

Garrigue, H., **Nouveaux résultats sur les radiations verte, jaune et rouge émises par le ciel nocturne.** [New results on the green, yellow and red radiation emitted by the night sky.] *Académie des Sciences, Paris, Comptes Rendus,* 205(11):491–493. Sept. 13, **1937. DLC**—The author continues his work (1936; *see* 8B–12) on the diurnal and annual variations of intensity in the lines 5577, 5888, and 6300 Å. Radiation at about 6520 Å does not vary during twilight and is more intense in winter than in summer. During twilight the 6300 Å line decreases gradually in intensity as the sun sinks further below the horizon. The interpretation due to Cabannes (1936; *see* 8B–12), involving a resonance excited by solar radiation in [OI] atoms, is shown to be insufficient, since even in the earth's shadow λ6300 is intense after sunset and then gradually waves. Towards dawn the intensity increases again. The mean intensity excluding twilight remains constant throughout the year. The line 5888 Å exhibits no diurnal variation but declines in brightness during summer. At λ5577 the time of maximum intensity depends on the azimuthal position of the spectrograph. The ratio horizon intensity/zenith intensity in winter is 1·8 to 2·5 for λ6300; 2 to 3 for λ5888; 1·5 to 7 (usually about 2) for λ5577. *Subject Heading:* **1. Night airglow intensity variations.**—*Physics Abstracts, No.* 4903, 1937.

1938–1939

8B–16 551.521.326

Grandmontagne, R., **Sur la couleur du ciel nocturne.** [Color of the night sky.] *Académie des Sciences, Paris, Comptes Rendus,* 207(4):275–277, July 25, **1938.** fig., refs. **DLC**—Observations of the energy distribution in the spectrum of the night sky have been made with a self-registering photoelectric photometer. The photo-cell used has a maximum sensitivity at 6200 Å and is relatively insensitive beyond 8000 Å; it is calibrated against a comparison source consisting of a tungsten lamp operated at 2100° K. The spectral regions in which measurements are made are isolated by means

of filters with cut-offs below 5800, 6550, and 7000 Å, respectively. The curve given shows a maximum from 7000 to 9000 Å separated by a minimum around 6800 Å from a second lower peak at 6100 Å. The energy is very low in the blue and violet. The measurements are means of observations made over 4 months: diurnal and annual variations are therefore smoothed out. *Subject Headings:* **1. Night sky color 2. Night airglow intensity distribution 3. Night airglow photometry.**—*Physics Abstracts, No.* 4038, 1938.

8B–17 551.521.326

Grandmontagne, R., **Variations annuelles de la lumière du ciel nocturne.** [Annual variations in the night airglow.] *Académie des Sciences, Paris, Comptes Rendus,* 207(5):321–323, Aug. 1, **1938.** fig., refs. **DLC**—Observations similar to those previously described (*see* 8B–16) have been made on all clear nights free from mist and moonlight from May 1937 to April 1938, inclusive. The energy in the region 5800–9000 Å is plotted against epoch. Three maxima are shown: one in Nov. corresponding to that found by RAYLEIGH and SPENCER JONES; another smaller one in March not taken into account by RAYLEIGH and SPENCER JONES in representing their results analytically, but shown by their individual observations and by those of CABANNES and DUFAY (*see* 8B–6) on the Vegard-Kaplan bands; and a third in June and July which is attributed to solar twilight. A slight phase difference between the author's results and those of RAYLEIGH and SPENCER JONES is attributed to the slightly shorter mean wave-length used by the latter. It is suggested that for purposes of observation of the night sky, astronomical twilight should be used (sun 18° below horizon). *Subject Headings:* **1. Annual emission spectra variations 2. Night airglow spectrum.**—*Physics Abstracts, No.* 4039, 1938.

8B–18 551.521.326

†Frongia, G., **La luce del cielo notturno.** [Light of the night sky.] *Il Nuovo Cimento,* 16(7):360–387, July **1939.** 3 figs., 4 photos, 9 tables, 88 refs., eqs. **DLC**—The author gives a detailed report on the present (1939) state of our knowledge of the night sky. An account is given of the experiments on the intensity and degree of polarization of the light of the night sky and its spectrum, with conclusive tables of the observed lines. A résumé of the interpretation of the spectrum is given together with a survey on the annual variations of the light. *Subject Headings:* **1. Night airglow intensities 2. Annual night airglow variations.**—*Physics Abstracts, No.* 403, 1940.

1942–1943

8B–19 551.594.52 551.521.326:535.243

Elvey, C. T. and Farnsworth, Alice H., **Spectrophotometric observations of the light of the night sky.** *Astrophysical Journal,* Chicago, 96(3):451–467, Nov. **1942.** 13 figs., 2 tables, refs., eq. **DLC**—Spectrophotometric observations of the light of the night sky have been made for the stronger lines of the visual region of the spectrum to determine (1) the variation of intensity with zenith distance to obtain a measure of the height of the auroral layer and (2) the curves of nocturnal variation of intensity. The variation of intensity with zenith distance indicates a height of 500 km for the auroral layer producing the red and green auroral lines, as well as the line of uncertain origin at λ6560. This is greater than the height obtained for the infrared radiations, 125 km. Curves of nocturnal variation of intensity were obtained at Bosque Alegre, Argentina; at Potrerillos, Chile; in the southern New England states; and at the McDonald Observatory (Univ. of Texas). The sodium line is relatively constant through the night, with enhancement at evening and morning twilights. The green auroral line is relatively constant throughout the night and through both twilights. The reported maximum near midnight has not been confirmed. The red auroral line has remarkable twilight effects, the one in the evening lasting for three or four hours after the end of twilight and the one in the morning beginning two hours before dawn. Figures show mean variations of intensity with zenith distance and nocturnal variations of intensity of the green auroral line λ5577, the red auroral line λ6300, the sodium line λ5893 and the line of uncertain origin λ6560 for Bosque Alegre, Potrerillos and the southern New England states. *Subject Headings:* **1. Auroras 2. Auroral heights 3. Night airglow 4. Spectrophotometric observation.**—*Partly from authors' abstract.*

8B–20 551.521.326

†Götz, F. W. Paul (*Arosa Obs.*), **Das Nachthimmelslicht.** [Night airglow.] *Handbuch der Geophysik,* Berlin, 8(2):415–427, **1942.** figs., 54 foot-refs. **DWB**—Progress made in night airglow research (mostly between 1930 and 1941) is reviewed. Problems connected with the brightness of night airglow, its origin, spectral composition, and intensity variations are discussed. It is suggested that airglow phenomena should be attributed to several factors, such as micrometeors, solar activity and possibly atmospheric resonant vibrations produced by extraterrestrial influences. *Subject Heading:* **1. Night airglow.**—*G.T.*

8B–21 551.521.326

Pearse, R. W. B., **The spectrum of the night sky.** *Physical Society of London, Reports on Progress in Physics*, 9:42–51, **1943.** table, 22 refs. **DLC**—Includes a description of the spectrum, difficulties in identification of radiations, discussion of atmoic lines and molecular bands and part played by absorption in the production of the night sky spectrum. Author suggests that future investigation should include: 1) improvement of spectrograms, 2) observation of the intensity variation of selected members of the band systems throughout the night and year and 3) further laboratory investigations of the spectra of O_2 and N_2. A table shows the degree to which night sky bands approximate observed bands in the two systems of NO. *Subject Heading:* **1. Night airglow spectrum.**—*M.L.R.*

1948

8B–22 551.521.326:535.33

Barbier, Daniel (*Paris Obs.*), **Présence dans le spectre du ciel nocturne d'un nouveau système de bandes encore inconnu.** [Presence of a previously undiscovered system of bands in the spectrum of the night sky. (In: International conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 8–12. fig., tables, 4 refs.) **DWB**—Details of the observations of unidentified bands (which might be due to an unknown system of CO) in the region $\lambda < 5000$ Å are compared with known systems of Vegard-Kaplan (N_2) and Herzberg (O_2). The frequency of the bands of the new system are given by the formula:

$$G = 21962 + 2576\, v' - 23.8\, (v')^2 - [2152\, v'' - 12.7\, (v'')^2].$$

Table gives calculated and observed frequencies for 25 lines, with only slight differences evident. *Subject Headings:* **1 Night airglow 2. Night sky spectroscopy 3. Carbon monoxide in stratosphere.** —*M.R.*

8B–23 551.521.326:525.33:551.593.55

†Bates, David R. (*Univ. College, London*), **Theoretical considerations regarding the night sky emission.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 21–33. 2 tables, refs., 16 eqs.) **DWB**—Two possible explanations of light of night sky are discussed: (1) release of potential energy stored in earth's atmosphere and (2) influx of particles. The first theory was advanced by Chapman, Wu, Mitra, Ghosh (1931–1944) and to some extent by Bates and Massey (1946). The second by Dauvillier (1932) and Elvey (1942) and partially subscribed to by the author. The spectral components are probably due to variety of causes. These are listed and discussed. Variations with latitude, time and height, and with sunspots (sporadic variations), variations in spectral composition, etc. are treated. Twilight effects are also of great importance in interpreting observations against theory. *Subject Headings:* **1. Night airglow 2. Night sky emission theories 3. Night sky spectra variations 4. Twilight radiation.**—*M.R.*

8B–24 551.521.326:535.33:537.59

Blackett, P. M. S. (*Manchester Univ.*), **A possible contribution to the light of the night sky from the Cerenkov radiation emitted by cosmic rays.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 34–35. 9 refs., 5 eqs.) **DWB**—Čerenkov discovered experimentally in 1934 that when fast electrons traverse a transparent material a continuous spectrum of visible light is emitted mainly in the direction of motion of the particles. Effect is explained by Vavilov (1934) and Tamm and Frank (1937). Calculations show that this Čerenkov radiation could account for only 10^{-4} of the total light of the night sky at sea level, but would set a limit on the darkness of the darkest night, as it would be visible even under a cloud layer. Spectral intensity would increase linearly with frequency up to the region of atmospheric absorption. *Subject Headings:* **1. Night airglow 2. Čerenkov radiation 3. Cosmic ray emission 4. Night sky spectroscopy. I. Čerenkov, P. A.**—*M.R.*

8B–25 551.521.326:551.593.55:551.508.93

Bricard, J. and Kastler, A., **Use of Savart-Lyot polariscope in the study of the nocturnal and twilight radiation.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 70–72. 8 refs.) **DWB**—Following Babcock's (1923) use of interference method to study night sky emissions without aid of spectrograph, the author suggests use of a thick quartz plate between two parallel or crossed polarizers and illuminated by convergent light. The fringes (Savart fringes) are focused behind the quartz plate by a lens and are photographed. By using a Wollaston prism the luminosity of the fringes is doubled. Details of apparatus used for photographing fringes in 5577, 5890, and 6300 Å emissions. The Na lines were absolutely identified by a laboratory technique which is described. Red lines will later be

identified in a similar manner. Apparatus is said to be cheaper, easier to transport, and useful in studying polarization of sky light. No polarization was found for the green line. *Subject Headings:* **1. Night airglow 2. Twilight radiation 3. Savart-Lyot polariscope.**—*M.R.*

8B–26 551.521.326:535.33

Déjardin, G. (*Univ. of Lyon, France*), **Le rayonnement du ciel nocturne: description du spectre et identification des radiations observées.** [The radiation from the night sky, description of the spectra and identification of the observed radiation.] (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers, 1948.** p. 3–8. table, 9 refs.) **DWB**—Review of knowledge to date of bands, identified by various authors, between 3029 and 5160 Å (tabulated *in extenso*), between 5000 and 7200 Å, and in the infrared 7200 to 10,440 Å. Difficulties in spectroscopy are enumerated. *Subject Headings:* **1. Night airglow 2. Night sky spectroscopy.** —*M.R.*

8B–27 551.521.326 551.594.5 551.593.55

†Dufay, Jean, **Recherches sur les phénomènes optiques de la haute atmosphère effectuées depuis 1940 à l'Observatoire de Lyon et à l'Observatoire de Haute-Provence.** [Research on the optical phenomena of the upper atmosphere since 1940 at the Observatory of Lyons and the Observatory of Haute-Provence.] *International Council of Scientific Unions, 6th Report of the Commission for the Study of Solar and Terrestrial Relationships.* pub. Orléans, **1948.** p. 144–156. 74 refs. **DWB, DLC**—Summarizes briefly works on: brilliance and color of the night sky, its polarization and the spectral composition of its light; intensity of rays of oxygen and sodium (5577, 6300 and 5892 Å); aurora; twilight phenomena; also laboratory research and theory. (*Same item as* 2.7–99, July 1951, *MAB.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. Twilight.**—*C.E.P.B.*

8B–28 551.521.326

Dufay, Jean and Tcheng, Mao-lin (*Haute Provence*), **Tentative de détermination de l'altitude des couches lumineuses de l'atmosphère pendant la nuit.** [Tentative determination of the height of luminescent layers of the atmosphere during the night.] (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 62–69. 3 figs., 10 refs., 2 eqs.) **DWB**—Theory and methods of observing or recording the height of luminescent layers is presented; the principle being the simultaneous measurement at different azimuths at the same zenith distances. Method of calculation described in detail and illustrated, along with sample photographic records. Author differs with Vassy (*see item* 8B–37) in supposing 2 layers, one normal and one sporadic. *Subject Headings:* **1. Night airglow 2. Emission layer heights.**—*M.R.*

8B–29 551.521.326:551.594.51:535.33

Dufay, Jean (*Lyon and Haute Provence Obs.*), **Variations d'intensité des raies d'émission du ciel nocturne.** [Variations of intensity of emitted light of the night sky.] (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947. **Papers.** pub. **1948.** p. 51–53. 2 figs.) **DWB**—At the Lyon Observatory and the Haute Provence Observatory 588 auroral and night sky spectrograms were obtained on 189 nights (1940–1944) and are analyzed and summarized in this paper. The diurnal and annual variations and those which correspond to solar activity are discussed and shown graphically. The 5577 Å line is strongest in all directions just after midnight; the 6300 and 5892 Å lines are strongest during the post-twilight or pre-dawn darkness. The 5577 Å line has a maximum in Oct. and a minimum in April, whereas the other two lines have maxima at winter solstice and minima at summer solstice, and for Na the difference is from 5 to 40 times the minimum values observed. The green band shows a marked 27-day cycle, but the red and yellow are indifferent to solar or magnetic activity. *Subject Headings:* **1. Night airglow 2. Auroral spectroscopy 3. Night sky spectroscopy 4. Diurnal emission spectra variations 5. Lyon Observatory, France 6. Haute Provence Observatory, France.**—*M.R.*

8B–30 551.521.326

Grandmontagne, R., **Mesures de brillance du ciel nocturne.** [Measurements of the brightness of the night sky.] (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, **1947, Papers.** pub. **1948.** p. 72–76. 10 refs.) **DWB**—Author presents a table to show differences in measurements of night sky light intensity by various authors from Newcomb (1901) to his own (1937 and 1938). These differ by an order of magnitude. He explains the discrepancy as due to ignoring spectral distribution of light when making visual observations. Use of a star (i.e., pole star) or a lamp as a standard is also not satisfactory. Methods used by various authors are discussed critically. *Subject Headings:* **1. Night airglow 2. Night sky brightness measurement 3. Night airglow intensities.**—*M.R.*

8B–31 551.521.326:551.594.51:551.590.29

Hoyle, Fred, **Extra-terrestrial influences.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 138–139. 2 eqs.) **DWB**—Evidence from light of the night sky and auroral observations indicates that particles entering the earth's atmosphere from the sun and interstellar space consist of (1) interstellar hydrogen flowing toward the sun at a rate of 40 km/sec and with a density of 500 atoms/cm^3; (2) emissions from sun by solar flares and M regions, directed along beams of small solid angle with a speed of 1.5×10^8 cm/sec and density between 1 and 10 atoms/cm^3. Interstellar material could acquire energies of order of 3000 ev, and solar material 100,000 ev, or enough to penetrate to about 90 km height above earth's surface. *Subject Headings:* **1. Auroral particles 2. Extraterrestrial influences 3. Solar flares 4. Night airglow 5. Interstellar space radiations.**—*M.R.*

8B–32 551.521.326:551.594.51:535.33

International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers read at the International Conference held under the auspices of the Gassiot Committee of the Royal Society in London in July 1947.** London, Physical Society, **1948.** 139 p. tables, graphs, bibliogs. In French or English. Price: 20 sh. **DWB**—A compendium of 25 papers (many of which are included in this bibliography) by outstanding theoretical and experimental workers (CHAPMAN, BARBIER, NICOLET, DUFAY, A. & E. VASSY, HULBURT, VEGARD, J. KAPLAN, H. ALFVÉN, D. R. BATES and others) in the field of auroral physics and light of the night sky from every country. (*Same item as* 4J–175, Oct. 1953, *MAB.*) *Subject Headings:* **1. Night sky spectroscopy 2. Auroral physics research 3. Emission spectra 4. Night airglow 5. Compendiums 6. International Auroral Conference, London, 1947. I. Physical Society of London II. Royal Society of London, Gassiot Committee.**—*M.R.*

8B–33 551.521.326

†Khvostikov, I. A., **Liuminestsentsiia atmosfery.** [Luminescence of the atmosphere.] *Uspekhi Fizicheskikh Nauk*, Moscow, 36(3):372–386, Nov. **1948.** 4 figs., 16 refs., eq. **DLC**—A brief history of scientific study of atmospheric luminescence, beginning, of course, with LOMONOSOV (1750) and his interest in the aurora borealis, and continuing down to the discovery of the aurora australis, the light of the night sky (1919) twilight luminescence (1936) and artificial excitation of fluorescence in the atmosphere (1947). Separate sections of this carefully prepared review article take up the night and twilight luminescence; the sodium luminescence in the tropopause; nature of the light of the night sky (120–250 km height) and photoluminescence measurements and theory. In addition to the author's work, he discusses that of ELVEY and FARNSWORTH (1942; *see* 8B–19). (*Same item as* 5.1–161, Jan. 1954, *MAB.*) *Subject Headings:* **1. Night airglow 2. Photoluminescence 3. Spectroscopic studies of skylight.**—*M.R.*

8B–34 551.521.326:551.594.5

†Khvostikov, I. A., **Svechenie nochnogo neba.** [Light of the night sky.] 2nd rev. ed. Moscow, Akademiia Nauk, **1948.** 495 p. plates, diagrs., 434 refs., eqs. **DLC**—A most intensive and comprehensive text dealing with recent problems of the upper atmosphere such as the aurora, light of the night sky, the green line in the spectrum of the night sky and aurora, atomic dissociation of nitrogen, oxygen and sodium, infrared radiation of the night sky, twilight phenomena associated with fluorescence or selective refraction, photometric analysis of zodiacal light, etc., polarizations of green line and other radiation, theories of light of the night sky, temperature in layers <120 km and 100–250 km, meteor trails, sunlit auroras, noctilucent clouds and many other problems. Extensive bibliography includes most of the important literature through 1947. (*Same item as* 2.10–99, Oct. 1951, *MAB.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. Twilight phenomena 4. Upper atmosphere research 5. Green auroral line 5. Auroral spectra.**—*M.R.*

8B–35 551.521.326:551.510.535:551.594.51

Nicolet, Marcel, **Deductions regarding the state of the high atmosphere.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 36–48. 4 tables, 5 refs., 35 eqs.) **DWB**—Author states that he believes: (1) the normal production of the night sky light is by recombination, with selective emission; (2) nonuniformity of emission is related to ionospheric structure, meteors, etc. which vary in space and time; (3) night sky light intensity correlates with magnetic activity; (4) atmospheric equilibrium is destroyed during ionospheric and magnetic storms and auroral emission; the spectral distribution becomes more uniform as the direct effect of the corpuscles increases. Detailed treatment of identifications of spectra; photodissociation and photoionization; molecular recombination, ionic recombination, collisions between negative ions and neutral atoms, and application to forbidden transitions. *Subject Headings:* **1. Night airglow 2. Auroral emission 3. Ionospheric structure 4. Ionization phenomena.**—*M.R.*

8B–36 551.521.326:551.594.51

Vassy, Arlette and Vassy, Étienne, **Altitude of the layer emitting the night-sky light.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 53–59. 2 figs., 2 refs.) Also: Vassy, Arlette; Abadie, Paul and Vassy, Étienne, **L'altitude des couches émettant la lumière du ciel nocturne dans les régions tropicales et sa variation au cours de la nuit.** [The altitude of the layers emitting the light of the night sky in tropical regions, and its variation during the course of the night.] *Académie des Sciences, Paris, Comptes Rendus,* 228(7):592–593, Feb. 14, **1949. DWB**—Based on measurements made at the Pic du Midi Observatory (2850 m) in 1943, 1945 and 1946, beginning 2 or 3 hrs after sunset. Methods of recording are described in detail. Theoretical curves are shown for 25 to 1200 km height, and compared with observed curves of intensity I/I_{∞} against air mass m; the latter curves fall into two groups, the higher intensity group which varies rapidly being attributed to auroral activity and the lower more stable one to ordinary or permanent night sky light. Not enough diffusion is evident to account for emission from a single layer; emitting layers are not uniformly distributed around earth; height of green line layers are 1000 km and 75–100 km, and red line layers at 750 km and 100 km respectively. The second paper (*same item as* 2–181, Feb. 1950, *MAB*) is a continuation of observations made on the Pic du Midi. In addition, observations made at Tamanrasset are included. *Subject Headings:* **1. Night airglow 2. Emission layer heights 3. Auroral emission 4. Night airglow intensities 5. Pic du Midi Observatory, France 6. Tamanrasset, Algeria.** – *M.R.*

8B–37 551.521.326:551.594.51

Vassy, Arlette and Vassy, Étienne, **Temporal and spatial variations in night-sky light.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 60–61. fig., 2 refs.) **DWB**—Altitude determinations of luminescent layers are made by ratio between observations made in different directions or angles from the zenith. There are both permanent and sporadic differences. Auroral activity constitutes one of the general accidental variations, and usually begins in the north about 9 p.m., and may have an intensity about 10 times the normal zenith intensity. Occasionally general red line enhancement in the north, about twice normal (consistent with 75–100 km emission layer) occurs. Cases of accidental differences are as frequent as those of normal differences, but must be eliminated from calculations of ordinary night sky luminescence layer height. *Subject Headings:* **1. Emission layer heights 2. Night airglow 3. Auroral emission 4. Night airglow intensities. I. Abadie, Paul.**—*M.R.*

8B–38 551.510.535:551.594.51:551.521.326

Vegard, Lars, **Report on recent work on ionospheric phenomena and on solar and terrestrial relationship.** (In: International Conference on the Emission Spectra of the Night Sky and Aurorae, London, 1947, **Papers.** pub. **1948.** p. 82–91. 3 refs.) **DWB**—A summary of many separate investigations reported in papers published by the author since 1940 in **Geofysiske Publikasjoner.** The problems discussed are: 1) detection and interpretation of new lines in auroral spectrum; 2) wave length and relative intensity of the weak component of the red [OI] doublet; 3) variability of intensity distribution within the auroral spectrum; 4) determination of ionospheric temperature from auroras at different altitudes and in sunlight; 5) origin and excitation of sodium line in twilight; 6) coronal phenomena and their relation to solar and terrestrial processes; 7) probability of an O atom losing its excitation energy through collisions. It is suggested that the sodium enters the atmosphere from the sun. (*Same item as* 3.9–89, Sept. 1952, *MAB.*) *Subject Headings:* **1. Auroral physics research 2. Night airglow 3. Auroral spectra 4. Ionospheric temperatures 5. Coronal phenomena 6. Earth's corona. I. Kvifte, G. II. Tönsberg, E.**—*M.R.*

1949

8B–39 551.521.326:551.510.355

Abadie, P.; Vassy, A. and Vassy, Mme. Étienne, **Sur la lumière du ciel nocturne; effet de latitude.** [Light of the night sky; effect of latitude.] *Annales de Géophysique,* 5(2):157–163, Feb. **1949.** 4 figs., 11 refs. **DLC**—This is a study of the probable mechanism of excitation of the light of the night sky and the altitude at which it originates. In order to avoid the disturbing influence of auroral activity, the authors have measured, at low latitudes, the distribution of the intensity of the light of the night sky for the bands 5577 and 6300 Å. The observations indicate that this phenomenon can be explained by assuming the existence of a single ionospheric layer, whose altitude decreases regularly from 1000 km at the beginning of the night to 400 km at 3 a.m. (*Same item as* 11–87, Nov. 1950, *MAB.*) *Subject Headings:* **1. Latitude effects on night airglow 2. Ionospheric layers.**—*I.L.D.*

8B–40 551.521.326:523.59

Divari, N. B., **Fotometricheskie nabliudeniia protivosiianiia.** [Photometric observations of the counterglow.] *Astronomicheskiĭ Zhurnal,* Moscow, 26(6):355–362, **1949.** 11 figs., 2 tables, 8 refs.

DLC. English translation available in: Hope, E. R., **The earth's exterior atmosphere and counterglow.** 2nd ed. *Canada, Defence Research Board,* T. 65 R, July **9954. DLC, DWB**—Results of observations of the counterglow carried out by the author at the Mountain Astrophysical Observatory near Alma Ata in autumn 1948 with aid of a lensless Fesenkov photometer and from then until spring 1949 by simple visual observation. After having described the procedure of the photometric observations which was to measure the brightness of the sky along different almucanters and pointed out that the brightness figures after correction for the galactic and atmospheric components and reduction to the distance of the pole, were those on which the investigation was based, the author draws the following conclusion: the increase in the brightness of the night sky in the region opposite to the sun amounts in the mean to 13% of the general brightness of the sky. The counterglow is not a constant object. Its shape, size, brightness and orientation change not only from night to night, but even in the course of a single night. During the second half of the night the counter glow and the zodiacal light show marked changes, sometimes forming a luminous cone. The absolute brightness of the counterglow increases with increasing sky brightness. *Subject Headings:* **1. Night sky brightness 2. Zodiacal light 3. Alma Ata, Kazakh S.S.R.**—*A.M.P.*

8B–41 551.521.326

Dufay, Jean, **Spectre du ciel nocturne dans le proche infrarouge.** [Spectra of the night sky in the near infrared.] *Annales de Géophysique,* 5(3):183–187, July–Sept. **1949.** fig., 2 tables, 10 refs. **DLC**—The spectrum of the night sky between 7500 and 9000 Å has been photographed with short exposures by means of a prism spectrograph. The spectrum is continuous but crossed by telluric lines and by very intense lines of unknown origin with a wave length greater than 8300 Å. (*Same item as* 2.1–101, Jan. 1951, *MAB.*) *Subject Heading:* **1. Night airglow infrared spectrum.**—*I.L.D.*

8B–42 551.510.53:551.521.326

Hulburt, E. O., **Night sky radiations from the upper atmosphere.** *American Journal of Physics,* 17(8):463–467, Nov. **1949.** 4 figs., 19 refs. **DLC**—A general discussion of present knowledge of night sky illumination (exclusive of auroral light). Subjects treated are: spectra of atomic and molecular origin; diurnal, annual and latitude variations; altitude of emissions and theory as to origin of night sky emissions. Aside from auroral effect, no latitudinal effect has been found. Altitude ranges from 60 km. to several hundred km. Of total visible light, $\frac{1}{5}$ is due to stars and $\frac{4}{5}$ to high atmosphere. (*Same item as* 6 32, June 1950, *MAB.*) *Subject Headings:* **1. Upper stratosphere 2. Night airglow.**—*M.R.*

1950

8B–43 551.521.326

Bricard, J. and Kastler, A., **Polarisation des radiations monochromatiques du ciel nocturne et de la raie D crépusculaire.** [Polarization of monochromatic radiation of the night sky and the crepuscular D ray.] *Annales de Géophysique,* 6(4):286–299, Oct.–Dec. **1950.** 18 figs., 20 refs. French and English summaries p. 286. **DLC**—A method for detecting night and twilight sky radiation without the use of a spectrograph is described. Instead, interference bands produced by quartz crystals in monochromatic light are photographed with filters and suitable plates. If the incident light is polarized the bands appear even without a polarizer. The red and green rays of the night and twilight sky are polarized only very slightly. The continuous background associated with yellow light is eliminated by receiving the interference bands through the slit of a dispersive spectrograph. (*Same item as* 3.1–110, Jan. 1952, *MAB.*) *Subject Headings:* **1. Night airglow 2. Nocturnal radiation.**—*I.L.D.*

8B–44 551.521.326:551.594.5

Currie, B. W., **Night sky brightness at latitude 52°.** *American Geophysical Union, Transactions,* 31(4):539–540, Aug. **1950.** table, 3 refs. **DLC**—Observations of the night sky brightness at Saskatoon, Canada, lat. 52°11′N, were made under a variety of ground, atmospheric and sky conditions. They indicate that the brightness on clear nights without visible polar aurora is appreciably greater than at lower latitudes. Large differences between the average brightness for nights without apparent differences in sky and atmospheric conditions, a seasonal variation in the average brightness corresponding approximately to the seasonal occurrence of the polar aurora, and observations of sky luminosities when polar aurora is present suggest that this increase in brightness is caused by light of polar auroral origin. (*Same item as* 2.1–100, Jan. 1951, *MAB.*) *Subject Headings:* **1. Night sky brightness measurement 2. Auroras 3. Saskatoon, Canada.**—*From author's abstract.*

8B–45 551.521.326

Elvey, C. T. (*U. S. Naval Ordn. Test Station, China Lake, Calif.*), **Note on the spectrum of the airglow in the red region.** *Astrophysical Journal,* Chicago, 111(2):432–433, March **1950.** table,

3 refs. **DLC.** Also issued as *Texas. Univ. McDonald Observatory, Contributions*, No. 187.—The author follows STRUVE's definition of *airglow* as light emitted by the upper atmosphere other than that known as polar aurora. *Light of night sky* is even more inclusive. Analysis is presented of wave lengths of airglow lines for seven spectrograms made with the CI spectrograph at McDonald Observatory, Fort Davis, Tex., from Aug. 21–Sept. 18, 1949. In addition to usual 5577 Å line, two red auroral lines of 6300 Å and 6364 Å, and blended sodium D line 5893 Å, a 6563 line identified as due to Hα and a 6847 line was unidentified. Other lines were identified as due to first positive system of nitrogen. *Subject Headings:* **1. Night airglow spectrum 2. McDonald Observatory, Tex.** —*M.R.*

8B–46 551.521.326 551.594.5

Elvey, C. T., **Progress in studies of the airglow in upper air research.** *American Journal of Physics*, Lancaster, Pa., 18(7):431–437, Oct. **1950.** 5 figs., foot-refs. **DLC**—Report of program supported by the Office of Naval Research at the U. S. Naval Ordnance Test Station at China Lake, Calif. Paper opens with a review of the nature of the light of the night sky. Sources of light of the night sky with continuous spectrum are: unresolved stars, galactic light, zodiacal light and light from all astronomical sources scattered by the atmosphere. The sources of light with line spectra are: diffuse nebulae of the galaxy, aurora and light of the night sky. The term "air glow" has been adopted by the author to designate light, other than polar aurora, emitted by the upper atmosphere. An explanation of the cause of airglow is given and the principal radiations in the air glow are listed. Gives location of observing sites and describes spectrograph and recording photometer. The spectroscopic and photometric programs are reviewed. "Spectroscopic observations of faint high altitude auroral rays and diffuse aurorae show some very interesting results which have not been completely analyzed. The Hα line has been identified as a faint component of the airglow spectrum; it may, however, be a result of distant high altitude aurorae. The photometric observations show that the green auroral line of oxygen has an intensity of 5×10^8 quanta/cm² sec and is emitted in a region near the E layer of the ionosphere at maximum in winter; that the sodium D lines correspond to 8×10^7 quanta/cm² sec, show a large annual variation, and are emitted from the general vicinity of the night F layer. Furthermore, resonance excitation of sodium atoms at twilight can be detected to heights of 800 km in the atmosphere." *Subject Headings:* **1. Night airglow spectrum 2. Auroral spectra 3. Green auroral line.**—*From author's abstract.*

8B–47 523.59:551.521.326

Karimov, M. G., **Issledovanie spektral'nykh svoĭstv zodiakal'nogo sveta.** [Investigation of the spectral properties of zodiacal light.] *Astronomicheskii Zhurnal*, Moscow, 27(2):97–104, **1950.** 3 figs., 3 tables, 7 refs. **DLC**—The investigation deals with the following topics: 1) Effect of intensification of emission lines at ionospheric levels in the zodiacal light. The photographing of the spectrum of zodiacal light made with a nebular spectrograph at the Alma Ata observatory (1400 m) proved that the green, blue and red lines of night sky luminescence are not only present in the zodiacal light spectrum, but become even more intense in comparison with the night sky luminescence in places where the zodiacal light is absent. 2) The proportion of luminescence of the continuous spectrum of night sky luminescence in the zodiacal light is from 22 to 25%. Thus in the zodiacal light, one fourth of the continuous spectrum belongs to luminescence of another nature. The energy distribution curve in zodiacal light has a quite different form than in the spectrum of night sky luminescence. 3) Color is one of characteristics of zodiacal light which can be numerically expressed by a color index or, better, by the distribution of energy in the spectrum. This distribution of energy in the zodiacal light spectrum can be determined by comparing it with the sun. An analysis of 4 spectrograms of zodiacal light shows that the color temperature of zodiacal light ranges between 6000 and 6300° and corresponds to the same spectral region as the sun. This proves that the phenomenon of zodiacal light is caused by dispersion of sun light by a dust medium filling the interplanetary space. *Subject Headings:* **1. Zodiacal light 2. Night airglow spectrum.**—*A.M.P.*

8B–48 551.521.326

Meinel, A. B., **OH emission bands in the spectrum of the night sky, Pt. I.** *Astrophysical Journal*, 111(3):555–564, May **1950.** 7 tables, 4 figs., 7 refs. Also: **Pt. 2.** *Ibid.*, 112(1):120–130, July **1950.** 5 tables, 3 figs., refs. Pt. 1.—High-resolution spectra of the infrared night sky obtained at Yerkes Observatory have shown conclusively that the previously unidentified infrared emissions are due to the rotation-vibration spectrum of OH. The agreement between the vibrational spacing, the rotational constants, and the doublet structure of the emissions and the predicted OH structure is excellent. The observation of vibrational levels up to $v=9$ shows that small inaccuracies exist in the currently accepted vibrational constants. A more accurate determination of these constants could be made, despite the low dispersion of the spectrograph. Other bands of this system of OH occur in the region of 1μ and may account for the radiation detected by STEBBINS, WHITFORD, and SWINGS, which has been attributed to N_2. Pt. 2—A detailed analysis has been made of the vibra-

tional constants for the ground state of OH, combining the observations of the night-sky rotation-vibration bands with laboratory data for the ultraviolet electronic OH bands. Systematic deviations were observed from the band positions predicted by w_e, and $w_e x_e$ from the ultraviolet bands. The deviations show, however, that the assignment of terms in $w_e y_e$, $w_e z_e$, . . . would not have any physical significance. The relative intensities have been determined for the night-sky bands from 9000 to 5500 Å. The resultant values show systematic changes of band intensity within each Δ_v sequence. A brief investigation of the band intensities under conditions of radiative equilibrium for cases of resonance and thermal excitation shows that the OH bands are probably produced by a chemical resonance mechanism and, further, that collisional de-excitation effects may be present. The temperature in the OH stratum was found to be 260°, 5°K from the distribution of energy in the resolved P branches and from the distribution of energy in the resolved P branches and from the ratio of intensity between the P, Q and R branches. *Subject Headings:* **1. OH emission bands 2. Night airglow infrared spectrum.**—*Author's abstracts.*

8B–49 551.521.326 551.594.5

Seaton, S. L., **Night sky brightness at College, Alaska.** *Journal of Geophysical Research*, 55(1):43–46, March **1950.** 2 figs., 3 refs. **DWB**—Measurements made during Feb. 1949 by means of a low brightness photometer, on the very few nights when auroral activity was absent, gave values as low as 70 mμL (near the zenith) and 180 mμL (at the horizon). During auroras the values range up to 40,000 mμL. Curves show decrease of zenith sky brightness after sunset on April 7 and 9, 1949, respectively. (*Same item as* 7–58, July 1950, *MAB.*) *Subject Headings:* **1. Night airglow 2. Auroras 3. College, Alaska.**—*M.R.*

1951

8B–50 551.521.326

Brown, Geoffrey M., **The airglow.** *Science Progress*, 39(156):623–639, Oct. **1951.** 3 tables, 46 refs. **DLC**—Airglow (=light of the night sky=non-polar or permanent aurora) accounts for 40% of residual sky light. It is nonpolarized and due to self-emission from excited constituents of the upper atmosphere. Spectrum is described and origin of the bands discussed. Intensity varies, especially during morning and evening twilight, due to direct absorption of solar radiation. Altitude uncertain but may be below 120 km. Theories of origin discussed are atomic recombination, ionized layer recombination, and incident particles. (*Same item as* 3.3–137, March 1952, *MAB.*) *Subject Heading:* **1. Night airglow.**—*C.E.P.B.*

8B–51 551.521.326:546.21

Davis, Dorothy N., **Variation of [OI] emission (5577) on the night of 5/6 January 1951.** *Journal of Geophysical Research*, 56(4):567–575, Dec. **1951.** 6 figs., 3 tables, 3 refs. **DWB**—Results of photoelectric observations of the night glow graphically represented. Height of the oxygen layer 200±25 km (deduced from the variation of I_z/I_0 with zenith distance) or 300 km (deduced from the time required for a given emission area to progress from east to west). *Subject Headings:* **1. Atomic oxygen 2. Night airglow 3. Spectral line 5577 Å [OI] 4. Cactus Peak, Calif.**—*A.A.*

8B–52 551.521.326:551.521.61:535.33

Dufay, Jean, **Bandes d'émission des molécules OH et O_2 dans le spectre du ciel nocturne, entre 9000 et 11000 Å.** [Bands of emission of OH and O_2 molecules in the spectrum of the night sky between 9000 and 11,000 Å.] *Annales de Géophysique*, 7(1):1–8, Jan./March **1951.** 3 tables, 23 refs. **DLC**—Recent work by many authors, in the field of spectroscopy of the visible or near infrared ($\lambda < 9000$ Å), is summarized and applied to the calculation of the position of origin of the OH molecule. Work by MEINEL in the region 9000–11000 Å is also analyzed. The probable structure of rotation of these bands is predicted and compared with observations of KRASOVSKIĬ, and it is shown that the 5 predicted bands are present in the light of the night sky. Also O_2 formed by recombination emits radiation 9000 and 11,000 Å. (*Same item as* 3.6–98, June 1952, *MAB.*) *Subject Headings:* **1. Night airglow infrared spectrum 2. OH emission bands 3. Spectroscopy.** —*M.R.*

8B–53 551.521.326:551.593.55:551.508.93

Geo-Science, Inc., Washington Grove, Md., **Twilight and airglow study.** Contract 19(122)-433, Report, No. 1, 2, and 3, May 1, Aug. 1, and Nov. 1, **1951.** 3 pieces. diagrs., graphs, tables, refs. **DWB**—Report No. 1 outlines the purpose and the scope of the project. Report No. 2 gives a survey of literature, translation of a Russian and a French article on night airglow and data for Wash., D. C., for July 1951. Report No. 3 is a continuation of electrophotometric recording of zenith twilight and night sky brightness at College Park, Md. Instrumentation was calibrated with NRL visual low brightness photometer. Records obtained during thunderstorm, aurora and various

moon phases are reproduced to illustrate these effects. Data for all types of illumination and cloudiness are presented. *Subject Headings:* **1. Night airglow 2. Zenith twilight 3. Washington Grove, Md. I. MacKenzie Merlin H. II. Yerg, Donald G.**—*M.R.*

8B–54 551.521.326:551.590.25

†Hoffmeister, C., **Spezifische Leuchtvorgänge im Bereich der mittleren Ionosphäre.** [Specific luminous phenomena in the middle ionospheric region.] *Ergebnisse der Exakten Naturwissenschaften*, 24:1–53, **1951.** 28 figs. (some in Suppl. p. 49–53), 21 tables, 115 refs. **DLC.** Summary entitled **"Investigations on bright night sky and luminous bands"** appeared in *British Astronomical Association, Journal*, 62(8):288–292, Oct. **1952.** plate (2 photos), 5 refs. (*See* 5.4–124, April 1954, *MAB.*) **DLC**—A summary of 30 years of systematic investigation with details of observation and a theory for the phenomenon of night airglow. Four kinds of phenomena can be identified: 1) diffuse illumination of the entire sky, 2) segment-shaped illumination near the horizon, 3) band-like displays, 4) chaotic displays. Height of emitting layer varies between 90 and 180 km with maximum frequency of occurrence at 120–130 km. The spectrum of the illuminated sky does not appear to differ greatly from that of the normal sky. The author's investigation does not bear out that of Götz and Störmer which indicates a strengthening of the sodium lines with increasing brightness of the sky. He suggests that luminous phenomena are caused indirectly by meteoric dust impacts on the high atmosphere, the intensity of the emission being controlled by the degree of ionization produced in the ionosphere by solar ultraviolet radiation. "An essential feature of the theory arises from the fact that the observations of persistent details within the luminescent layers allow the investigation of air currents at heights of about 120 km." Night airglow phenomena are not to be confused with auroras, noctilucent clouds, meteor trails and zodiacal light. *Subject Headings:* **1. Night airglow 2. Meteoric dust.**—*M.L.R.* (*From English summary*).

8B–55 551.521.326:551.510.53

Hulburt, E. O., **Night-sky radiations from the upper atmosphere.** [In: **Compendium of Meteorology.** Boston, American Meteorological Society, **1951.** p. 341–346. 3 figs., 2 tables, 27 refs.) **DLC**—The radiations from high atmospheric gases are four or five times as intense as all the other sources combined, if we omit polar auroras and the moonlight. The sources and intensities of the wave lengths in the night sky spectrum are tabulated from 10,440 to 3029 Å and diurnal and annual variation in the total intensity, which are relatively small, are discussed. The intensity has a maximum at midnight and in the winter. The atomic oxygen line 5577 has a 27-day variation in intensity caused by solar influences. Almost no changes with latitude are observed. (*Same item as* 4.8–11, Aug. 1953, *MAB.*) *Subject Headings:* **1. Nocturnal radiation 2. Night airglow 3. Upper atmosphere 4. Compendium articles.**—*A.A.*

8B–56 551.594.51 551.521.326

†Meinel, A. B., **The spectrum of the airglow and the aurora.** *Physical Society of London, Reports on Progress in Physics*, 14:121–146, **1951.** 5 figs., 8 tables, 60 refs. **DLC**—Begins with an account of the spectrum of the night sky from 3000–14,000 Å, consisting of bands due to various gases and a continuous background of uncertain origin. It is attributed to region below 120 km. The characteristic spectrum of the twilight glow is briefly described, and the spectrum of the aurora is discussed and illustrated in detail. The atomic and molecular processes involved are discussed. Temperature estimates from the aurora diverge widely. (*Same item as* 3.3–258, March 1952, *MAB.*) *Subject Headings:* **1. Night airglow spectrum 2. Auroral spectra.**—*C.E.P.B.*

8B–57 551.521.326:551.594.51

Nicolet, M., **Problèmes de l'émission spectrale du ciel nocturne et des aurores.** [Problems of the spectral emission of the night sky and of auroras.] *International Council of Scientific Unions, 7th Report of the Commission for the Study of Solar and Terrestrial Relationships.* pub. Paris, **1951.** p. 165–182. table, 38 refs. **DWB**—Three symposia in 1947 initiated important progress. Known radiations from the night sky are tabulated but altitudes and temperatures of the emitting layers are mostly uncertain. From night sky and auroral radiations some conclusions are drawn about vertical changes of composition of the atmosphere. Chemical and physical processes are discussed. Twilight observations are based on dissociation of N_2 at very high levels. (*Same item as* 3.7–121, July 1952, *MAB.*) *Subject Headings:* **1. Night airglow 2. Auroral spectra.**—*C.E.P.B.*

8B–58 551.510.4:546.33:551.510.535

Saha, Arun Kumar, **Sodium in the upper atmosphere.** *Indian Journal of Physics*, 25(8):375–386, Aug. **1951.** table, 23 refs., 4 eqs. **DLC**—The paper first surveys the available data for the sodium phenomena in the upper atmosphere, namely, intensity variations of the D lines in the night airglow and in the twilight flash, the height of the emitting layers, the distribution of sodium in the atmosphere and its probable source. The various excitation processes, both regarding the twilight

flash and the night airglow emission are closely examined. It is shown that the most probable mode of production of the twilight flash is resonance excitation of neutral sodium atoms in 35–65 km region by solar radiation λ5893, there being no significant effect of zone screening. The possible excitation processes in the night airglow are examined critically on the assumption that the height of the emitting layer is 250 km (as obtained by BARBIER and ROACH) and that above 100 km sodium exists wholly in the ionized state (as shown by BATES). Two possible excitation processes are examined: 1) radiative recombination of Na^+ ions and 2) mutual neutralization of Na^+ and O^- ions. Of these two processes the latter seems more probable as the former requires impossible high concentration of Na^+ ions. But the latter process cannot maintain the observed intensity of the radiation throughout the dark hours of the night. Hence, it is concluded that extra-terrestrial particles must be bombarding the upper atmospheric regions, ionizing and/or exciting the neutralized Na^+ ions. Alternatively, it may be assumed that sodium atoms are entering the atmosphere from interplanetary space. (*Same item as* 4.10–11, Oct. 1953, *MAB.*) *Subject Headings:* **1. Sodium spectra 2. Atmospheric composition 3. Night airglow.**—*Author's abstract.*

8B–59 551.521.326

Wilcox, John B. (*Univ. of Alaska*), **Characteristics of the night sky at College, Alaska.** *International Council of Scientific Unions. Mixed Commission on Ionosphere, 2nd Meeting, Brussels, Sept. 1950, Proceedings.* pub. **1951.** p. 81–84. 3 figs., 3 refs. **DWB**—A visual low brightness photometer was used at a station at 64°52′N and 147°49′W to determine Arctic night sky brightness. Contour maps show mean values for 2 groups of data: those taken during aurora and those taken when there was no aurora. Mean height of equivalent "emitting layer was found to be approximately at 600 km." *Subject Headings:* **1. Night sky brightness 2. Emission layer heights 3. College, Alaska.**—*M.L.R.*

8B–60 551.521.64:551.510.535

Yonezawa, Toshiyuki (*Central Radio Wave Obs.*), **On the corpuscular stream from the sun as viewed from the standpoint of ionosphere research.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan,* 5(4):183–185, **1951.** 9 refs. **DWB**—A short review of the literature published in this field. The sporadic E layer ionization and some night sky light phenomena may be caused by corpuscular streams. The corpuscular effect on the main ionospheric layer could be neglected for most practical purposes. *Subject Headings:* **1. Corpuscular radiation 2. Ionospheric research 3. Night airglow 4. E layer.**—*A.A.*

1952

8B–61 551.521.326 551.521.32

Barbier, Daniel (*Inst. d'Astrophysique and Obs. de Paris*), **L'altitude des couches emettrices du ciel nocturne.** [Altitude of the emission layers of the night sky.] *Société Royale des Sciences de Liège, Mémoires,* Ser. 4, 12(1/2):43–56, **1952.** 5 tables, 17 refs. **DLC**—Several methods are outlined for measuring the height of the layers where night airglow emissions occur. Difficulties in using the photometric method are enumerated—namely multiple layers, interference from zodiacal light and superposition of several wave lengths, geographic irregularities, etc. The results, according to various authors, of measurement of height of green, red, Meinel (OH) bands, Herzberg (O_2) bands, Végard-Kaplan (N_2) bands, etc. are tabulated and discussed. (*Same item as* 5.8–135, Aug. 1954, *MAB.*) *Subject Headings:* **1. Night airglow spectrum 2. Emission layer heights 3. Night airglow photometry.**—*M.R.*

8B–62 551.521.326

Barbier, Daniel (*Astrophysical Inst. and Obs., Paris*), **Solution approchée d'un problème de transfert et son application à la détermination des corrections de diffusion dans les mesures photométriques de la lumière du ciel nocturne.** [Approximate solution of a transfer problem and its application to the determination of diffusion corrections in photometric night airglow measurement.] *Annales d'Astrophysique,* 15(3):247–259, **1952.** 9 tables, 6 refs., 38 eqs. **DLC**—Deals with the numerical evaluation of the basic Rayleigh equations for the diffusion through layers of finite thickness; considering also the function for the light source. A simpler first approximation is proposed as well as an elaborate system of polygonal expressions. The reflection at the base of the diffusion layer is considered. The night sky radiation assumed as a light source of uniform density at 100 km height, is derived as a numerical example, obtaining a satisfactory agreement already for a third order approximation. *Subject Headings:* **1. Radiative transfer 2. Light diffusion 3. Night sky radiation.**—*A.A.*

8B–63 551.521.326

Berthier, Pierre, **Intensité relative des deux composantes du doublet du sodium dans la lumière du ciel nocturne.** [Relative intensity of the two components of the sodium doublet in the light of the night sky.] *Académie des Sciences, Paris, Comptes Rendus*, 234(2):233–234, Jan. 7, **1952.** 6 refs. **DLC**—Since the transition $2p_{\frac{1}{2}}{}^{-2}s$ (5890 Å) is more probable than $2p_{\frac{3}{2}}{}^{-2}s$ (5890 Å) the D_2-ray in the nocturnal sky light is more intense than D_1. The author found in the laboratory $D_2/D_1 = 2.01 \pm 0.03$ but under field conditions 1.98 ± 0.05. This small difference is explained by the weakening of D_2 through M_2 ray (5890 Å). *Subject Headings:* **1. Night airglow 2. Sodium spectra.** —*A.A.*

8B–64 551.521.326

Chuvaev, K. K., **O svechenii zemnoĭ atmosfery v nepreryvnom spektre.** [Luminosity of the earth's atmosphere in a continuous spectrum.] *Akademiia Nauk SSSR, Doklady*, 87(4):551–554, **1952.** 4 figs., 2 tables, 11 refs. **DLC**—Brief report on observational results made in Crimea. Energy distribution in the continuous spectrum differs considerably from the distribution for stars of the type GO, as it is generally assumed, but is similar to that of the type K5. There may be two causes of nocturnal sky light, one which originates the radiation λ 5577 and another one which gives the continuous spectrum. *Subject Headings:* **1. Night airglow 2. Upper atmosphere.**—*A.A.*

8B–65 551.521.326:551.593.55

Geo-Science, Inc., **Twilight and airglow study.** Contract AF 19(122)-433, Reports, No. 5-II, 6-II, and 7-II Technical phase, Feb. 20–June 21, June 21–Sept. 10, and Aug. 21–Oct. 31, **1952.** July 10, Oct. 10 and Nov. 15, **1952.** 21, 23 and 26 p. figs., tables. **DWB**—Electrophotometric recordings of zenith night sky brightness near Wash., D. C., in the form of continuous traces has been in effect during the phases of these reports. The data collected are presented in tabular form. Night sky brightness corrected to full moon has been plotted as a function of moon altitude in degrees for three classifications of trace recording. A second recording system has been installed to embrace the twilight illumination encountered in the range from zero solar depression to nighttime conditions. Zenith twilight intensity has been plotted as a function of shadow height in kilometers for clear and cloudy, moonless twilight intervals. *Subject Headings:* **1. Night airglow 2. Zenith twilight 3. Electrophotometric observations. I. MacKenzie, Merlin H. II. Kohls, Fred F. III. Cronin, Harold E.**—*From authors' abstracts.*

8B–66 551.521.326

*Houtgast, J., **A photometric investigation of the sky-light from sunset to sunrise.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):117–134, **1952.** 11 figs., 4 tables, foot-refs. **DLC**—Detailed report on equipment and observations made at Haute Provence Observatory, France (44°N, 0°23'E) during May and June 1948. The data and analysis concern: (1) the variation of the intensity in the night airglow spectrum from sunset to sunrise, and at 3 points at 43° elevation; and (2) the absolute intensities of the scattered light and of the 5577A (OI) line. At Utrecht Observatory spectrograph with a Schmidt camera was used. Results agree quantitatively with those of Roach and Pettit at Cactus Peak. *Subject Headings:* **1. Night airglow measurements 2. Night airglow photometry 3. Spectral line 5577 Å (OI) 4. Haute Province Observatory, France.** —*M.R.*

8B–67 551.521.326

Kaplan, Joseph (*Univ. of Calif., Los Angeles*), **Laboratory studies related to the physics of the upper atmosphere.** *Société Royale des Sciences de Liège, Mémoires*, Ser. 4, 12(1/2):295–302, **1952.** **DLC**—Results of experiments on the discharges and afterglow spectra in O_2 and O_2—N_2 mixtures and to O_2—H_2O, He—O_2—H_2) and O_2—H_2O—N_2 mixtures are discussed in connection with previous work of Meinel (that the OH molecule gives rise to prominent features in the infrared night airglow spectrum, and that the height of the OH emission is 70 km). The importance of O_2 in the basic processes, and the remarkable similarity between laboratory and atmospheric airglow spectra are shown in this report. *Subject Headings:* **1. Laboratory airglow spectra 2. Night airglow infrared spectrum.**—*M.R.*

8B–68 551.521.326

Karimov, M. G., **Effektivnaia vysota svecheniia nochnogo neba dlia trekh spektral'nykh luchei.** [Effective height for night sky brightness for three spectral rays.] *Astronomicheskiĭ Zhurnal*, Moscow, 19(4):472–475, July/Aug. **1952.** 2 tables, 3 refs. **DLC**—Report on experimental work using V. G. Fesenkov's calculation method. Brightness of sky as a function of effective height was computed by following equation:

$$I = I_0 \frac{(1+h)(p+x)^{\sec z}}{\sqrt{(1+h)^2 - \sin^2 z}},$$

where I is brightness of emission layer for zenith, p—coefficient of transparency, x—factor of diffusion light influence. The observations (Dec. 1950–Jan. 1951) showed that the brightness of red and green lines of the spectrum is associated with heights from 200 km up to 320 km and probably is formed in the F layer. At the same time the height of yellow line by the observations of twilight was established as 65 to 130 km. (*Same item as* 5.1–160, Jan. 1954, *MAB.*) *Subject Headings:* **1. Night sky brightness heights 2. Night airglow spectrum.**—*N.T.Zikeev.*

8B–69 551.521.326

Kvifte, Gotfred Ingolf, **Natthimmellyset.** [The light of the night sky.] *Naturen*, Bergen, 76(2):49–58, **1952. DWB**—The line spectrograph is described. Only $\frac{1}{4}$ of the light of the night sky is due to light from stars. The origin of the light is ascribed to "ignition" of the atoms by some external energy—possibly solar radiation, possibly cosmic radiation. The green as well as the red line in aurora borealis is explained by the peculiar capacity of the atoms to resume their fundamental state after the "ignition." This condition is known as "forbidden" radiation. A. B. MEINEL's recent observation of a band system in the infrared is assumed due to oxygen-hydrogen and its mean temperature to be somewhat below 0°C. The remainder of the radiation is of molecular origin. (*Same item as* 4.1–131, Jan. 1953, *MAB.*) *Subject Headings:* **1. Night airglow 2. Scintillation 3. Radiation.**—*W.N.*

8B–70 551.521.326:535.24

Mayot, Marcel (*Astrophys. Inst., Paris*), **Tables de fonctions intervenant dans le calcul des corrections de diffusion dans la photométrie de la lumière du ciel nocturne.** [Table of functions applicable to the computation of diffusion corrections in photometry of the light of the night sky.] *Annales d'Astrophysique*, 15(4):374–382, **1952.** 6 refs., eqs. **DLC**—BARBIER's functions ϕ_0, ϕ_1 and ϕ_2 for corrections of the diffusion in photometry of the light of the night sky are transformed so as to be easily calculated for heights of 0, 50, 100, 200, 400, 800 and ∞, and for τ from 0.00 to 0.70. Detailed tables of these functions are included. *Subject Headings:* **1. Night airglow 2. Diffusion corrections 3. Night airglow photometry.**—*M.R.*

8B–71 551.521.326

†Mitra, S. K., **Lights from the night sky.** (In his: **The upper atmosphere.** 2nd ed. Calcutta, The Asiatic Society, [preface] **1952.** p. 485–548. 2 tables, 30 figs., 152 refs. (p. 662–666).) **DLC**—An excellent review of progress made in light of the night sky research. The chapter opens with a brief discussion of zodiacal light, gegenschein and galactic light. This is followed by a more detailed summary of present knowledge of night airglow. Results of spectroscopic and photometric studies (night airglow spectrum, variations in night airglow, heights of luminescent layers, etc.) are summarized. The origin of night airglow, methods of excitation and causes of variation in intensity are discussed. Instruments are described and spectra reproduced. The extensive bibliography (without titles) with references to literature in English, French, German and Russian includes imprints from 1874 to 1951. *Subject Headings:* **1. Night airglow 2. Night airglow bibliographies.**—*M.L.R.*

8B–72 551.521.326

Nicolet, Marcel (*Royal Met. Inst., Belgium*), **Les altitudes théoriques des couches d'émission nocturne.** [The theoretical height of the nocturnal emission layer.] *Société Royale des Sciences de Liège, Mémoires*, 12(1/2):71–86, **1952. DLC.** Also issued as: *Belgium. Institut Royal Météorologique, Contributions*, No. 4.—The emission of OH and O_2 is interpreted, finding a lower limit of 200 km height after the consideration of the excitation mechanism and the spectral structure of the emission. The homosphere and heterosphere is defined, the constitution of the atmosphere discussed, and some photochemical aspects in the chemosphere and ionosphere are analyzed, considering also the emission of sodium, oxygen, N_2^+ and N1. *Subject Headings:* **1. Night airglow spectrum 2. Emission layer heights 3. Upper atmosphere.**—*A.A.*

8B–73 551.521.326:016

†Penndorf, R., **Nachthimmelslicht (Luftleuchten).** [Light of the night sky (airglow).] (In: Landolt, Hans Heinrich and Börnstein, Richard, **Zahlenwerte und Funktionen aus Physik, Chemie, Astronomie, Geophysik und Technik.** 6th ed. v. 3. **Astronomie und Geophysik.** Berlin, Springer, **1952.** p. 774–781. 5 tables, 6 figs., 51 refs.) **DWB, DLC**—The following subjects are covered: source of light of night sky, light density of night and twilight sky, spectrum (twilight glow, airglow and atom and continuous and band spectra), polarization, emission heights and variations (periodic and aperiodic, long period, annual, daily). The references (most with imprints since 1940) are arranged according to the above topics. A table of identified bands and lines is included. *Subject Headings:* **1. Night airglow bibliographies.**—*M.L.R.*

8B–74 551.521.326

Roach, Franklin E. and Pettit, Helen B., **Excitation patterns in the nightglow.** *Société Royale des Sciences de Liège, Mémoires,* 12(1/2):13–42, **1952.** 19 figs., 2 tables, 17 refs. **DLC**—Systematic photometric observation of nightglow made in the Mojave Desert, Calif., from 1948 to 1951 is reported. Methods of differentiating between terrestrial and extra-terrestrial contributors to the light of the night sky are discussed and the use of filters for the same purpose described. Data on three atomic radiations are presented and their diurnal and seasonal variation, height of emission and movement of excitation patterns analyzed. (*Same item as* 4.4–137, April 1953, *MAB.*) *Subject Headings:* **1. Night airglow 2. Atomic radiation 3. Radiation filters 4. Mojave Desert, Calif.** —*G.T.*

8B–75 551.521.326:550.385:551.510.535

Siedentopf, H. and Behr, A., **Zur Ionosphärenstörung vom 23. bis 28. Februar 1952.** [On the ionospheric disturbance of Feb. 23–28, 1952.] *Naturwissenschaften,* 39(16):377–378, Aug. **1952.** table, 3 refs. **DLC**—Observations of zenith green light and of yellow and blue at 70° zenith distance at Tübingen showed a marked increase from Feb. 21–26. This was associated with a magnetic storm beginning on 23rd, ionosphere disturbance on 24th and a rise of temperature by 30–40°C. between 24 and 28 km, culminating on 26th. *Subject Headings:* **1. Night airglow 2. Magnetic storms 3. Ionospheric disturbances.**—*C.E.P.B.*

8B–76 551.521.326 551.594.51

†Swings, Pol (*Liège Univ.*) and Meinel, A. B. (*Yerkes Obs. Chic. Univ.*), **The spectra of the night sky and the aurora.** (In: Kuiper, Gerard P. (*ed.*), **The atmospheres of the earth and planets.** Rev. ed. Chic., Univ. of Chic. Press, **1952.** p. 159–210. figs., table, numerous foot-refs., eqs.) **DWB**—This chapter is a revision of that published in the first edition of the book and is the most important change in the new edition. It consists of the following sections: 1) Description of the night sky and twilight spectra including an account of the molecular bands: Meinel system of OH, atmospheric system of O_2, the Vegard-Kaplan (ϵ) system of N_2, the Herzberg system of O_2, other possible O_2 systems and the Cameron bands of CO, negative bands of N_2. Ozone O_2, β and γ systems of NO, etc.; temperature determined on the basis of the rotational intensity distribution in the molecular bands, determination of heights of emission, intensity variation and twilight phenomena. 2) Description of the auroral spectra including atomic lines and molecular bands and temperatures based upon rotational and vibrational intensity distributions. 3) The relation between the night sky, aurora and ionosphere, N_2 in the upper atmosphere. The photodissociation of O_2, the ionization of N_2 as revealed by auroral and twilight spectra, ionization of O_2 as revealed by auroral spectra, temperature of the upper atmosphere, classification of emissions according to their intensities, mechanism of excitation of the intense infrared night sky radiation, night sky emission interpreted as a conversion dissociation energy into excitation energy mechanism of excitation of the night sky based on the ionized layers, interpretation of twilight aspects and mechanism and excitation of the aurora. (*Same item as* 5C–224, March 1954, *MAB.*) *Subject Headings:* **1. Night airglow spectrum 2. Auroral spectra.**—*I.L.D.*

8B–77 551.521.326:551.506

Vassy, Arlette and Vassy, Étienne (*Paris Univ.*), **Sur l'interprétation de quelques anciennes mesures.** [Interpretation of some old measurements.] *Société Royale des Sciences de Liège, Mémoires,* 12(1/2):57–61, **1952.** fig., 6 refs. **DLC**—The authors take up some points raised by various scientists in connection with their earlier work on the height of emission of the night skylight. They reject the idea of interfering stellar light as a significant source of error in their measurements, and show that discrepancies between their results obtained on the Pic du Midi and those appearing at lower locations, are due to light emitted within the atmosphere, a circumstance which favors the accuracy of their contested measurements. *Subject Headings:* **1. Night airglow 2. Emission layer heights.**—*G.T.*

1953

8B–78 551.508.25:551.521.326

Baillet, A.; Barbier, D.; Bosson, F.; Lallemand, A. and Maguery, J., **Description d'un photomètre automatique pour l'étude de la lumière du ciel nocturne.** [Description of an automatic photometer for the study of the light of the night sky.] *Annales de Géophysique,* 9(4):309–316, Oct./Dec. **1953.** 5 figs., 6 refs. French and English summaries p. 309. **DLC**—An automatic recording photometer which measures the intensity of light of the night sky (night airglow) at the zenith and in a small circle around the zenith with a 7 min cycle, is described in detail and the circuits, operation and sensitiveness of equipment described and illustrated. The recorder is a Chauvin-Arnoux Rectigraph with 600 ohms resistance and a current of 5×10^{-8} amp. The apparatus has been in use since July 1951 at the Haute-Provence Observatory. The light recorded is not mono-

chromatic (as this takes too long an exposure) but is in a certain spectral region which is reported by means of a filter. *Subject Headings:* **1. Night airglow photometers 2. Recording photometers 3. Haute-Provence Observatory, France.**—*M.R.*

8B–79 551.521.63:535.24

Barbier, Daniel, **Étude photométrique de la région ultraviolette de la lumière du ciel nocturne.** [Photometric study of the ultraviolet region of nightglow.] *Annales d'Astrophysique*, 16(2):96–128, **1953.** 16 figs., 5 tables, 14 refs. **DWB**—An automatic photometer, and its filter, installed at the Haute-Provence Observatory are described. Measurements of UV radiation made with the instrument (Sept. 1951–Aug. 1952) at zenithal distances 75° and 45° are analyzed in detail. Atmospheric diffusion and extinction are considered. The altitude of emission is found to be 200±50 km. Diurnal and annual variations of intensity show definite resemblance to those of green light. Localized emission observed on three occasions is attributed to auroras too weak for direct observation. (*Same item as* 5.1–166, Jan. 1954, *MAB.*) *Subject Headings:* **1. Night airglow photometry 3. Ultraviolet variations 3. Haute-Provence Observatory, France.**—*G.T.*

8B–80 551.521.326

Barbier, Daniel, **Quelques résultats sur le spectre de la lumière du ciel nocturne.** [Some results on nightglow spectra.] *Académie des Sciences, Paris, Comptes Rendus*, 237(12):599–601, Sept. 21, **1953.** 5 refs. **DWB**—The author comments on the spectrophotographs he obtained in the 3000 Å–6500 Å range. Discussed in particular are the Herzberg bands of O_2, the Vegard-Kaplan bands of N_2, the Meinel spectrum of OH and certain peculiarities found in several other bands. *Subject Headings:* **1. Night airglow spectrum 2. Spectrophotometric observation.**—*G.T.*

8B–81 551.521.326

Berthier, Pierre, **Sur l'émission crépusculaire et nocturne des bandes de OH et O_2 dans le proche infrarouge.** [On the twilight and night sky emission of OH and O_2 in the near infrared.] *Académie des Sciences, Paris, Comptes Rendus*, 236(18):1808–1810, May 4, **1953.** refs. **DWB**—Photometric measurements of band intensities from evening twilight to dawn. Confirmation is found for the strengthening of the (0.1) band of O_2 during evening twilight, accompanied by a less marked strengthening of OH bands. During the night stronger variations are observed; they showed regularity during the period Jan.–March 1953. *Subject Headings:* **1. Night airglow spectrum 2. Twilight infrared spectrum.**—*Trans. of author's abstract.*

8B–82 551.521.326

Chamberlain, Joseph W. and Oliver, Norman J. (*Geophysics Res. Directorate, A.F. Cambridge Res. Center*), **Stellar absorption lines in night-sky spectra.** *Astrophysical Journal*, 118(2):197–199, Sept. **1953.** 2 figs., foot-refs. **DWB**—Evidence is presented that the blue and violet regions of the light of the night sky are primarily composed of starlight rather than airglow emission. Most of the features heretofore believed to be emission bands are probably unreal, the deceptive appearance being produced by surrounding absorption lines. This interpretation not only explains numerous previously unidentified features but also may reconcile the observed intensities of true emissions with their theoretical transition probabilities. Moreover, the night-sky continuum, so predominant in the blue, is attributed to stellar, not to airglow, radiation. *Subject Headings:* **1. Night airglow spectrum 2. Night sky continuum.**—*Authors' abstract.*

8B–83 551.521.326 523.59

Divari, N. B. (*Politechnic Inst., Odessa*), **Fotometricheskie nabliudeniia nochnogo neba.** [Photometric observations of the night sky.] *Priroda*, Moscow, No. 3:88–89, March **1953. DLC**—A not too technical account of Soviet research on the illumination of the night sky carried out during the period 1941–45 in central Asia by the Astrophysical Institute of the Academy of Sciences of the Kazakh SSR with the aid of the V. G. Fesenkov photometer. The most characteristic curves of change in brightness are (1) curves with the minimum near midnight, (2) continuous decline throughout the night and (3) with maximum near midnight. The author discusses the relationship between these curves, the observed darkening near twilight (which is attributed to a nonuniform change in the illumination components), the problem of the zodiacal light, and in conclusion the fact that after-twilight-illumination and the brightness of corresponding portions of zodiacal light visible in the east are the same phenomenon as zodiacal light. *Subject Headings:* **1. Night airglow 2. Zodiacal light.**—*I.L.D.*

8B–84 551.593.55 551.521.326

*Geo-Science, Inc., Washington Grove, Md., **Twilight and airglow study.** Contract AF 19(122)-433, Final Report for the period Jan. **1951**–Jan. **1953.** 44 p. 19 figs., tables. **DWB**—A summary of work done at Washington Grove, Md., and reproduction of many automatic records, graphs and

tables of data from the 2 years of records of moonlight, moonless sky, twilight (evening and morning) and zenith light throughout the night. Calibration curves and methods, and other details of instrumentation are given. A seasonal variation in zenith light was found to be independent of moon altitude, showing that zenith light intensity is twice as great in summer as in winter. Night sky light shows no correlation with magnetic K-index. Morning to evening twilight shows a ratio of 1.2 to 1 for shadow height to 90 km and 0.8 for heights above 150 km. (*Same item as* 5.2 295, Feb. 1954, *MAB.*) *Subject Headings:* **1. Twilight illumination 2. Night airglow 3. Airglow investigations. I. MacKenzie, Merlin H. II. Kohls, Frederick F. III. Cronin, Harold E. IV. Seaton, S. L.**—*M.R.*

8B–85 551.506.5:551.521.326:551.521.12(675,68.01)

*Herrinck, P., **Observations photométriques du ciel nocturne et observations de rayonnement solaire et de températures au plateau des Bianos (Congo Belge). Mission effectuée sous l'égide de l'I.R.S.A.C.)** [Photometric observations of the night sky and solar radiation and temperature observations on the Bianos Plateau, Belgian Congo. Mission sponsored by the Institut pour la Recherche Scientifique en Afrique Centrale.] *Belgian Congo. Service Météorologique, Publication*, No. 2, **1953.** 53 p. 8 figs., 8 photos, tables, 15+18 refs. **DWB.** Reprint from *Belgium. Institut Royal Colonial Belge, Section des Sciences Naturelles et Médicales, Mémoires* (in 8°), 23(2), **1953. DLC**—This report consists of 2 memoirs by the author, one on the photometric observations of the night airglow (Roach photometer) in the Belgian Congo at Biano Katanga (long. 26°07½′ and lat. 10°12′S, $h=1600$ m) and at Panfontein (long. 26°50′E, lat. 25°56′S) near Kaster in the Union of South Africa (with heights of 50–55 km for oxygen and 220±50 km for Na 5893 doublet) during May, June and July 1950. The second is on 5 months (Jan.–June, 1950) of observations of solar radiation and temperature on the Plateau of Bianos in Katanga. (*Same item as* 7.3–11, March 1956, *MAB.*) *Subject Headings:* **1. Night airglow observations 2. Solar radiation data 3. Biano Katanga, Belgian Congo 4. Panfontein, South Africa.**—*M.R.*

8B–86 551.521.326

Huruhata, Masaaki, **Photoelectric studies of the night sky light.** *Tokyo. Univ. Astronomical Observatory, Annals, Ser.* 2, 3(4):165–174, **1953.** 5 figs., 4 tables, 13 refs., 3 eqs. **DLC**—Photoelectric photometries of the main five emissions from Nov. 1946 to July 1948 were discussed in their daily, seasonal and yearly variations of the intensities, besides the heights of their emitting layers. The variations were compared with the available ionospheric data, and the correlations with them were studied. The mean correlations of the intensities of the emissions on 20 nights with the electron density of the F2 layer are positive for all lines. The method of reducing the height of emitting layer of the night sky was examined by considering (1) computing formulas, (2) effect of extinction and (3) drift of the night sky light; and 300 km is concluded as the most reliable value of the height. *Subject Headings:* **1. Night airglow intensity variations 2. Emission layer heights.**—*Author's abstract.*

8B–87 551.521.326:016

†Resnik, Robert and Stein, Stanley, **The spectra and chemical kinetics of the upper atmosphere. A literature survey.** Pittsburgh. Univ. Spectroscopy Laboratory, Contract AF 19(122)-478, Scientific Report, No. 1, Pts. 1–6, Oct. 31, 1952–Aug. 10, **1953.** 6 pieces. **DWB**—Sec. 1 of Pt. I and V (Subject Classification), contains approximately 370 references to airglow. The references are arranged chronologically and alphabetically under the following headings: a) general, b) spectral observations, c) observations other than spectral and d) theory and interpretation. In Pt. 2–4 (Author Classification) will be found abstracts for a number of the references. Each part contains a list of the journals cited. (*Same item as* 5.7–11, July 1954, *MAB.*) *Subject Headings:* **1. Night airglow bibliographies 2. Upper atmosphere bibliographies.**—*M.L.R.*

8B–88 551.521.326

Roach, F. E.; Williams, D. R. and Pettit, Helen (*U. S. Naval Ord. Test Station, China Lake, Calif.*), **Diurnal variation of [OI] 5577 in the nightglow.** *Astrophysical Journal*, Chicago, 117(3): 456–459, May **1953.** 4 figs., 2 tables. **DLC**—Measurements of intensity of 5577 made at Cactus Peak (Calif.) during two nights (Jan. 1951, Nov. 1952) are reported and discussed. Isophote maps for each hour and variation diagrams are presented. Attention is called to an apparent motion of the localized maximum which is east-to-west before, and west-to-east after the maximum intensity is reached. During the maximum the motion stops. These observations were made by the U. S. Naval Ordnance Test Station, China Lake, Calif. (For earlier paper on the subject *see* 4.4–136, April 1953, *MAB.*) (*Same item as* 5.1–164, Jan. 1954, *MAB.*) *Subject Headings:* **1. Night airglow 2. Spectral line 5577 Å [OI] 3. Cactus Peak, Calif.**—*G.T.*

8B–89 551.521.326

Roach, F. E.; Williams, D. R. and Pettit, Helen B. (*U. S. Naval Ord. Test Station, Pasadena and China Lake, Cal.*), **The diurnal variation of [OI]5577 in the nightglow: geographical studies.** *Journal of Geophysical Research*, 58(1):73–82, March **1953.** 3 figs., 3 tables, 21 refs. Comments by Vassy, A. and Vassy, E., entitled **Lueur nocturne et activité aurorale** [Nightglow and auroral activity]. *Ibid.*, 58(2):283–284, June **1953.** In French. **DLC**—In the region from N latitudes 36° to 44° the nightglow radiation [OI]5577 has been reported to undergo a diurnal change in intensity, resulting on the average in an intensity maximum approximately one hour after midnight. The amplitude of the maximum is such that it is 1.3 times the mean intensity for the entire night. Marked departures from this average variation are noted on individual nights. Two simultaneous sets of observations at Cactus Peak in Calif. and at the Haute Provence Observatory in France are studied in order to compare the diurnal variation at stations with a large difference of longitude. It is found that the variations have similar patterns in general but with significant differences in detail. On two occasions approximate triangulations on emission maxima yield a height of 180 km. Attention is called to a similarity between the diurnal variation of the nightglow 5577 at low latitudes and of the polar aurora at high latitudes. (*Same item as* 5.1–163, Jan. 1954, *MAB.*) *Subject Headings:* **1. Night airglow 2. Spectral line 5577 Å [OI] 3. Haute Provence Observatory, France 4. Cactus Peak, Calif. I. Vassy, A. II. Vassy, E.**—*Authors' abstract.*

8B–90 551.521.326

Roach, F. E,; Pettit, Helen B.; Williams, D. R.; St. Amand, P. and Davis, Dorothy N. (*all, U. S. Naval Ordnance Test Station, China Lake, Calif.*), **A four-year study of [OI] 5577 Å in the nightglow.** *Annales d'Astrophysique*, Paris, 16(4):185–205, July/Aug. **1953.** 15 figs., 9 tables, 15 refs. Also their: **A comment on . . .** *Ibid.*, 17(5):427–428, Sept./Oct. **1954. DLC**—A systematic survey is made of 66 nights of observation of [OI] 5577 at Cactus Peak, California, from Nov. 1948 to Dec. 1952. The mean intensity of the radiation varies from 50×10^6 to 350×10^6 quanta/cm² column-second. The minimum intensity, the maximum intensity and the general level of activity are proportional to the mean intensity. No correlation between sunspot activity and the intensity of 5577 is found. The radiation shows a seasonal variation with a maximum in September to November and a flat minimum in May to July. A negative correlation between magnetic activity (K_p) and 5577 activity is indicated by the data. A comparison of results from 17 nights at the Haute Provence Observatory with the Cactus Peak data indicates that the region of maximum intensity tends to be predominantly to the south at Haute-Provence and somewhat to the north at Cactus Peak. The data suggest the existence of an excitation wind moving from east to west in the evening, stopping during the middle hours (near the time of maximum intensity) and moving from west to east with a strong southerly component in the morning. In the second article the authors clear up an incorrect impression made in the first article by stating that the intensity of [OI] 5577 Å in the night airglow cannot be predicted for a given night. (*Same item as* 5.7–96, July 1954, *MAB*; *see also* 6.10–163, Oct. 1955, *MAB.*) *Subject Headings:* **1. Night airglow spectrum 2. Spectral line 5577Å [OI] 3. Cactus Peak, Calif.**—*Authors' abstract.*

1954

8B–91 551.521.326

Ashburn, Edward V. (*U. S. Naval Ordnance Test Station, Inyokern, China Lake, Calif.*), **The effect of atmospheric scattering and ground reflection upon the determination of the height of the night airglow.** *Journal of Geophysical Research*, Wash., D. C., 59(1):67–70, March **1954.** table, 4 refs., eqs. **DWB**—CHANDRASEKHAR's theory of radiative transfer was used to calculate the effect of atmospheric scattering and ground reflection upon the determination of the height of the night airglow when the extinction coefficient is 0.15. It was found that the atmospheric scattering is a significant factor, but that the ground reflection is not important except for high albedo (snow cover). (For abstract of similar title in *J. of Atmos. and Terr. Physics*, 5(2):83–91, **1954,** *see* 5.8–134, Aug. **1954,** *MAB.*) *Subject Headings:* **1. Night airglow 2. Atmospheric scattering.**—*Author's abstract.*

8B–92 551.521.326

Barbier, Daniel, **Étude photométrique de la région bleue de la lumière du ciel nocturne.** [Photometric study of the blue region in the night airglow.] *Annales d'Astrophysique*, 17(2):97–103, March/April **1954.** 5 figs., 12 refs. **DLC**—The height of the emissions in the blue region of the night airglow at the Observatory of Haute-Provence was found to be about 200 km (possibly 100–400 km). Diurnal and annual variations in the blue (4166, 4416 and 4540 Å) and in the UV show that there is more similarity between the values of the UV and blue in the same year, than between the UV curves of 2 different years (1951–2 and 1953). Correlation between blue and UV intensity is shown by scatter diagram of mean value of each from a number of nights. Scatter is partly due

to uncertainty of blue measurements arising from starlight and from shorter period over which UV measurements can be made each night. Methods of measurement and compilation of data are described. *Subject Headings:* **1. Night airglow spectrum 2. Haute-Provence Observatory, France.** —*M.R.*

8B–93 551.521.326

†*Barbier, Daniel; Dufay, Jean and Williams, Donald (*Haute-Provence Observ., France*), **Investigation of the green line emission in the night airglow.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:137–183, July **1954.** 20 figs., 11 tables, 32 refs., 28 eqs. Discussion p. 177–181. **DLC**—Measurement of the 5577 Å and 5180 Å radiations of the night airglow were conducted with a Roach photometer. A detailed examination was made of the corrections which were applied to the observations. The diurnal and annual variation of the intensities of these emissions was determined. The 5180 Å radiation consists essentially of a continuous spectrum emitted in the high atmosphere at an altitude of 460 km. The 5577 Å radiation, isolated by the interference filter, is emitted at 305 km. The component of the 5577 Å emissions due to the green line of atomic oxygen is emitted at 215 km, but the latter result is still uncertain. There is a good correlation between the intensities of the two radiations observed. Examination was made of the structure of the layer which emits the green line, and displacements of this layer were investigated. *Subject Headings:* **1. Night airglow measurements 2. Green line emission.**—*Author's abstract.*

8B–94 551.594.5 551.521.326

†Bernard, R. G. (*Univ. of Lyons, France*), **Excitation of the spectrum of molecular nitrogen in the laboratory in the high atmosphere.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:243–269, July **1954.** 6 figs., 16 tables, 58 refs., eq. Discussion p. 261–266. **DLC**—Studies of the distribution of intensities of the various lines composing a band has permitted determination of an emission temperature. In night airglow studies by CABANNES and DUFAY on the Vegard-Kaplan bands, temperature $T=230°K$ approximately. VEGARD's latest measurements in auroral studies on the separation of rotational lines of the negative bands 3914 and 4278 Å indicate $T=219°K$, slightly lower than the previous estimates. Analyses of the intensity of the negative bands and the second positive bands in the aurora, together with measurements of the excitation functions in the laboratory, permit estimation of the energy of the exciting electrons (about 30 *e*V). *Subject Headings:* **1. Nitrogen spectra 2. Auroral spectra 3. Night airglow spectrum.**—*From author's abstract.*

8B–95 551.521.326:551.593.55:535.33

Broida, H. P. and Gaydon, A. G., **The Herzberg bands of O_2 in an oxygen afterglow and in the night-sky spectrum.** *Royal Society of London, Proceedings, Ser. A*, 222(1149):181–195, March 9, **1954.** plate, 4 tables, 25 refs. **DWB**—The afterglow bands of O_2 in an uncondensed discharge at about 2 mm pressure are compared with the night sky spectrum. It is concluded that the Herzberg bands are present in the night sky; they are probably excited by recombination of O atoms. The afterglow spectrum also shows the green auroral line and the "atmospheric" band of O_2 at 7593 Å. Diffuse bands appear to be due to NO_2. The air afterglow may form part of the night sky continuum. *Subject Headings:* **1. Night airglow 2. Twilight phenomena 3. Oxygen bands.**—*C.E.P.B.*

8B–96 551.521.326

Cario, Günther and Stille, Ulrich, **Über das Auftreten der Natrium-D-Linien im Nachthimmelleuchten und im Nordlicht.** [On the occurrence of sodium D lines in the night sky light and in aurora.] *Braunschweigische Wissenschaftliche Gesellschaft, Abhandlungen*, 6:62–67, **1954.** fig., 18 refs. English summary p. 62. **DLC**—In the course of investigations of the twilight effect of the D lines of sodium, 14 spectra were photographed on March 1, 1941, showing the strong aurora on this evening. The spectra prove unambiguously that the twilight-effect occurs completely undisturbed and independent of the aurora observed at the same time; i.e., the layers normally emitting the D lines in the night sky are not affected by the aurora. The auroral spectrum does not contain the D lines. Thus the aurora took place above the layer emitting the D lines in the night sky. Occasional observations of the D-lines in auroras of higher layers indicate that in such cases the sodium was of extraterrestrial origin. *Subject Headings:* **1. Sodium D line 2. Night airglow.**—*Authors' abstract.*

8B–97 551.521.326:016 551.594.5:016

†Chamberlain, J. W. and Meinel, A. B., **Emission spectra of twilight, night sky, and aurorae.** (In: Kuiper, Gerard P. (*ed.*), **The earth as a planet.** Chicago, Univ. of Chicago Press, **1954.** p. 514–575. table, 18 figs., refs. p. 568–575.) **DWB.** Also issued in reprint form, as Chicago. University. Yerkes Observatory, Contract AF 19(122)-480, Technical Report, **1954. DWB**—A thorough review of the subject of the twilight night photometry, identification of spectra (forbidden atomic lines,

etc.), height, variations in auroral spectra, auroral temperature and theory, height of emission layers and temperature of night airglow, excitation processes, theory, etc. A most complete bibliography (alphabetical by author) of about 300 items on airglow and auroral theory and spectra (without titles) is included. (*Same item as* 6B–182, Feb. 1955, *MAB.*) *Subject Headings:* **1. Auroral spectra 2. Night airglow bibliographies 3. Auroral physics bibliographies. I. Contract AF 19(122)-480 II. Chicago. Univ. Yerkes Observatory.**—*M.R.*

8B–98 551.521.326:535.33

Chamberlain, Joseph W., **The formation of atmospheric O_2 emission in the airglow.** *Astrophysical Journal*, 119(2):328–333, March **1954.** 2 figs., 19 refs., 6 eqs. **DLC**—A suggestion by BATES, that absorption of the O_2 atmospheric 0–0 band followed by emission of 0–1 may be an important source of the observed airglow O_2 emission, is investigated quantitatively. An approximate equation of radiative transfer is soived and applied to a model atmosphere. In the limiting case of no collisional de-excitation, BATES's fluorescent mechanism could account for about 75% of the observed emission, and this portion would arise from a layer at about 50 km. The low rotational temperatures that have been determined for the 0–1 band are tentatively interpreted as an effect of collisional de-excitation and thus may not represent kinetic temperatures. *Subject Headings:* **1. Night airglow 2. Emission spectra.**—*Author's abstract.*

8B–99 551.521.326

Chamberlain, Joseph W., **Sur la structure de rotation des bandes ultraviolettes du ciel nocturne.** [On the structure of the rotation of the ultraviolet bands of the night sky.] *Académie des Sciences, Paris, Comptes Rendus*, 238(12):1329–1331, March 22, **1954.** fig., refs. **DLC**—The structure of rotation of the ultraviolet bands was identified in a night sky spectrum obtained recently. According to the structure identified most of the bands may be attributed to the Herzberg system of O_2. However, the progression $v'=0$ is rather weak in this region. Several other bands exist but have not been positively identified as yet. *Subject Headings:* **1. Night airglow spectrum 2. Ultraviolet band of night sky.**—*Trans. of author's abstract.*

8B–100 551.521.326:535.33

Dufay, Jean and Tcheng, Mao-Lin, **Sur l'altitude d'émission de la raie verte du ciel nocturne.** [Altitude of the emission of the green ray of the night sky.] *Annales de Géophysique*, 10(1):1–8, Jan./March **1954.** 2 figs., 5 tables, 10 refs. French and English summaries p. 1. **DLC**—In the previous spectroscopic observations concerning the height of the layer emitting the [OI] line $\lambda=5577$ Å at night, imperfect calibration of the absorbing screen, utilized for the standardization of the photometric plates, arose from the light scattered by the screen. With the screen densities corrected for this effect, the factor $K=J(70°)/J(20°)$ decreases in the average of about 5 or 7%. Thus the altitude of the emitting layer is strongly increased and becomes nearly 215 km, in perfect agreement with the photoelectric observations made by D. BARBIER, J. DUFAY and D. WILLIAMS. *Subject Headings:* **1. Night airglow 2. Emission spectra 3. Emission layer heights.**—*Authors' abstract.*

8B–101 551.521.326:551.521.6

Gol'danskiĭ, V. I. and Zhdanov, G. B., **O cherenkovskom izluchenii kosmicheskikh chastits v atmosfere.** [On Čerenkov radiation due to cosmic particles in the atmosphere.] *Zhurnal Eksperimental'noĭ i Teoreticheskoĭ Fiziki*, Moscow, 26(4):405–416, **1954.** 4 figs., 4 tables, 12 refs., 11 eqs. **DLC**—This article contains extensive calculations of energies and amounts of Čerenkov night sky luminosity arising from primary cosmic rays, and from extensive air showers, respectively. Formulas are presented for visible portion of airglow due to primary and due to all cosmic radiation of an energy greater than 3.8×10^{-9} under specified pressure, temperature and angle of incident radiation. *Subject Headings:* **1. Night airglow from cosmic rays 2. Cosmic ray luminosity 3. Čerenkov radiation.**—*M.R.*

8B–102 551.521.326

Heaps, H. S. and Herzberg, G. (*Natl. Res. Council, Ottawa*), **Intensity distribution in the rotation-vibration spectrum of the OH molecule.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:271–289, July **1954.** 4 figs., 7 tables, 18 refs., 58 eqs. Discussion p. 286–289. **DLC**—The rotation-vibration spectrum of OH has been observed by MEINEL in the night airglow. For the purpose of establishing the mechanism leading to this emission, calculations have been made of the intensity distribution in the vibration spectrum of a Morse oscillator equivalent to the OH molecule. On the assumption of a linear dipole moment variation, an explicit formula for the transition probabilities is obtained and the numerical values are evaluated up to $v=12$. If the assumption is made that the OH molecules in the night airglow are first formed in the $v=9$ level and then cascade down to $v=0$, an intensity distribution similar to that observed is found.

The effect of a quadratic term in the dipole moment is also considered. The matrix elements of this quadratic term are evaluated up to $v'=8$ and $v''=3$. By introducing these quadratic terms into the transition probabilities, a fair quantitative agreement is obtained between observed and calculated relative intensities. Predictions are made for the intensities of the OH bands of the $\Delta v=1$, 2, and 3 sequences which lie in the farther infrared, in a spectral region not yet investigated in the night airglow. A rough estimate of the number of OH molecules formed in the upper atmosphere in the $v=9$ level is 9×10^{11}/cm² column/sec. *Subject Headings:* **1. Emission spectra 2. Night airglow spectrum.**—*Authors' abstract.*

8B–103 551.521.326

†Krasovskiĭ, V. I., **Ob infrakrasnom izlucheniĭ nochnogo neba.** [Infrared radiation of the night sky.] *Uspekhi Fizicheskikh Nauk, Moscow,* 54(3):469–494, **1954.** 2 tables, 70 refs., 11 eqs. **DLC**—A review of literature (Russian and foreign) through 1953 on radiation from night sky in region 7000–20,000 Å. The author has done a great deal of research in this field since 1949. A table gives height of luminous layer according to 5 authorities (70 to 900 km). *Subject Headings:* **1. Night airglow 2. Night sky infrared radiation.**—*M.R.*

8B–104 551.521.326

Lenoble, Jacqueline, **Remarque sur le rôle des diffusions multiples dans la luminance du ciel.** [Note on the role of multiple diffusion in the brightness of the sky.] *Académie des Sciences, Paris, Comptes Rendus,* 239(5):409–411, Aug. 2, **1954.** 3 refs. **DWB**—The contribution of diffusion of increasing order to night sky brightness decreases in geometric progression (with a possible deviation of a few per cent) determined by wave length only. This applies to high-order diffusion in every case and to all orders, including primary diffusion, if the sun or the point of observation is not too distant from the zenith. *Subject Headings:* **1. Night airglow 2. Diffuse radiation 3. Night sky brightness.**—*Trans. of author's abstract.*

8B–105 551.521.326:535.33:546.17

Nicholls, R. W. (*Univ. of Western Ontario, London*), **The kinetics of excitation of molecular nitrogen and other molecules.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Paper,* No. 30:291–319, July **1954.** 10 figs., 3 tables, 27 refs., 47 eqs. Discussion p. 311–318. **DLC**—The method of excitation kinetics is outlined. In this, the population and depopulation rates of molecular energy levels in a small region of a spectroscopic source are examined and equations are set up relating the existing populations of energy levels to these rates. The intensity of radiation from any of these levels is governed by the excitation conditions by being proportional to the population in the upper state, and to the molecular radiation constants by being proportional to the product of transition probability and energy separation between initial and final levels. Using the population equations appropriate to an assumed excitation mechanism, the intensity of a line or band is expressed in terms of excitation parameters (electron concentration and temperature, molecule concentration, etc.) and molecular constants (transition probabilities, energy level separations). The expressions are useful in an experimental investigation of excitation mechanisms, and the dependence of radiated intensity upon excitation conditions. The method is illustrated from a number of possible excitation mechanisms in N_2, N_2^+ and NO where steady state conditions are assumed. Accompanying experimental work is briefly described and some speculations are made on some profitable experimental and theoretical extensions of this work. (*Same item as* 7.1–229, Jan. 1956, *MAB.*) *Subject Headings:* **1. Night airglow spectrum 2. Nitrogen bands.**—*Author's abstract.*

8B–106 551.521.326:535.33 551.594.51:535.33

†Nicolet, Marcel, **Problèmes de l'émission spectrale de la lumière du ciel nocturne et des aurores.** [Problems of the spectral emission of the light of the night sky and of auroras.] *International Council of Scientific Unions, Brussels, Eighth Report of the Commission for the Study of Solar and Terrestrial Relationships.* Paris, **1954.** p. 123–156. 208 refs., eqs. **DWB**—This systematic review of the voluminous literature from 1950–1954 is classified as follows: Spectroscopic analysis; Identification of the spectrum of light of the night sky; Identification of the auroral spectrum; Characteristics of the principal radiations of the night sky; Twilight conditions; Considerations on the oxides of nitrogen and their nocturnal light; Principal characters of the auroral emission. The main points are the new data on the energy of dissociation and emission spectra of oxygen and nitrogen, the calculation of the theoretical transitions of vibration and rotation which clarifies the structure of atmospheric emissions (though the interpretation of the numerous observations of night sky light is not yet clear) and the progress in the physics of aurora (identification of O and bands of N_2, temperatures based on the structure of rotation, and analysis of radio reflections). *Subject Headings:* **1. Night airglow spectrum 2. Auroral spectra.**—*C.E.P.B.*

8B–107 551.521.326:546.33

Ogawa, Masaru, **On the origin of sodium D-lines in the nightglow and twilight flash.** *Tokyo. University of Education. Institute for Optical Research, Science of Light,* 3(1):47–61, Aug. **1954.** 8 figs., table, 15 refs., 26 eqs. **DWB**—The low pressure reactions of sodium with atomic oxygen, molecular oxygen and ozone have been investigated in order to make laboratory check of CHAPMAN's process of the nightglow. Sodium vapor reacts with ozone in the gas phase accompanied only by the emission of D lines which are slightly diffuse. The velocity of reaction between atomic sodium and ozone is larger than that between atomic sodium and molecular oxygen. On the basis of experimental results and in consideration of the dissociation energy of NaO, one plausible process to explain the above chemiluminescence is set forth, which differs from that of CHAPMAN. It is impossible, however, to attempt to attribute to this process the origin of the sodium D lines in the nightglow and the twilight flash in the upper atmosphere. CHAPMAN's process would appear to be endothermic and therefore not plausible. (*Same item as* 7.4–175, April 1956, *MAB.*) *Subject Headings:* **1. Sodium D line 2. Night airglow spectrum 3. Twilight sodium spectrum.**—*Author's abstract.*

8B–108 551.521.326:535.33

Osherovich, A. L. and Rodionov, S. F., **O svechenii nochnogo neba v oblasti ot 1 do 3 mikron.** [Light of the night sky in the range of 1 to 3 microns.] *Akademiia Nauk SSSR, Doklady,* 96(6): 1159–1160, June 21, **1954.** 2 figs., 9 refs. **DLC**—The characteristics and operations of a electrophotometer with a lead-sulfur photo resistance for measuring the light of the night sky in the region 1–3μ are described. Some results of measurement of energy received are given. *Subject Headings:* **1. Night airglow measurement 2. Electrophotometers.**—*I.L.D.*

8B–109 551.521.326

Pearse, R. W. B. (*Imperial Coll. of Sci. and Tech., London*), **Identification of lines and bands in the night airglow and aurora.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers,* No. 30:341 366, July **1954.** 2 figs., 9 tables, 18 refs. Discussion p. 362–365. **DLC**—The identification problem is considered from the point of view of laboratory research. Some general remarks are made concerning the provisions and availability of laboratory data for purposes of identification. Since July 1947, considerable progress has been made in understanding the emissions of the airglow, aurora and of spectra of possible and known constituents of the atmosphere. Some of the identifications are discussed and short lists of the more probable atomic lines are given. Attention is directed to the question of absorption. Since the emission from each layer must pass through the lower layers before observation, absorption is definitely indicated in the case of ozone and molecular oxygen. Absorption may also provide the explanation of certain intensity variations and anomalies. An abrupt change in the intensity of the continuous spectrum near 4000 A in the spectrum of the night airglow has been commented on by several authors. Several alternative explanations of the continuum have been given. However, none appear entirely satisfactory. *Subject Headings:* **1. Night airglow 2. Absorption.**—*From author's abstract.*

8B–110 551.521.326

Pettit, Helen B.; Roach, F. E.; St. Amand, P. and Williams, D. R., **A comprehensive study of atomic emissions in the nightglow.** *Annales de Géophysique,* Paris, 10(4):326–347, Oct./Dec. **1954.** 13 figs., 12 tables, 12 refs. French and English summaries p. 326. **DLC**—A study of the nightglow emissions at λ5577, λ5893, and λ6300 A at Cactus Peak, Calif., during the period Nov. 1948 to March 1954 shows that the diurnal and seasonal intensity variations are in good agreement with previous reports. No correlation between sunspot activity and the intensity of any of the emissions is found. The only positive correlation between any two of the emission intensities is for 5893 and 6300. The directional tendency for the area of maximum brightness for any one night to be north, in the zenith, or south of Cactus Peak has a seasonal variation in all three emissions, with that of sodium being most pronounced. In the summer, when the intensity for sodium is the lowest, the predominant direction of its maximum is south; in the winter, when the intensity is greatest, the direction is north. This fact leads to a prediction of a possible geographical motion of the maximum intensity area of sodium (*Same item as* 6.9–180, Sept. 1955, *MAB.*) *Subject Headings:* **1. Night airglow 2. Night airglow spectrum 3. Atomic emissions in night airglow 4. Cactus Peak, Calif.**—*Authors' abstract.*

8B–111 551.521.326

Roach, F. E. (*U. S. Naval Ordinance Test Station*), **Diurnal and seasonal variation of the airglow.** *National Academy of Sciences, Chicago, Proceedings,* 40(10):950–956, Oct. **1954.** 5 figs., 3 tables, 5 refs. **DWB**—Origin of night airglow spectral lines, intensities compared with aurora, diurnal variations in intensity in different parts of the sky, apparent motion across sky during night, seasonal variation, theories as to migratory motions and problems which can be solved during IGY are

discussed and illustrated. Relation between night glow and aurora, and geographical variations in airglow can be determined by chains of observers from Alaska or Canada to Peru, and from N. Europe to S. Africa and Japan to Australia. Data used and illustrations are mainly from Sacramento Peak, N. Mex., and Cactus Peak, Calif. *Subject Headings:* **1. Night airglow research 2. Night airglow network for IGY 3. Sacramento Peak, N. Mex. 4. Cactus Peak, Calif.**—*M.R.*

8B–112 551.521.326

Roach, F. E. (*U. S. Naval Ordnance Test Sta., Pasadena, Calif.*), **Diurnal variation of the [OI] 5577 A radiation in the night airglow.** *U. S. Air Force. Cambridge Research Center, Geophysical Research Papers*, No. 30:185–203, July **1954.** 12 figs., 2 tables, 9 refs., 2 eqs. Discussion p. 199–203. **DLC**—An attempt has been made in this investigation to reduce all the observations for a given night to the local zenith intensity. This reduction permits the construction of isophote maps and allows an interpretation of the results in terms of geographical distribution of the excitation of the 5577 Å line. An examination was made of a series of isophote maps for the night of Jan. 6–7, 1951. This study indicated that the general features of the diurnal variation may be described by a fixed nocturnal excitation pattern under which the earth rotates. Quantitative support for this viewpoint is present. The possibility that an electrical discharge may be the source of the night airglow radiation is discussed. *Subject Headings:* **1. Night airglow 2. Spectral line 5577 Å [OI].** —*From author's abstract.*

8B–113 551.521.326

Roach, F. E.; Williams, D. R.; St. Amand, Pierre; Pettit, Helen B.; Weldon, R. G. and Manring, Edward, **Simultaneous observations of nightglow 5.577 at two stations, Pt. 1–2.** *Annales d'Astrophysique*, Paris, 17(3):172–196, May/June **1954.** figs., tables, refs. **DWB**—In Pt. 1, observations of [OI] 5.577 in the nightglow at Sacramento Peak, New Mexico, and Cactus Peak, Calif., are recorded for the night of Aug. 9/10, 1953. The great circle distance between the two stations is 1.160 km (720 mi). The difference of lat. is 3°18′ and of long. 12°0′ or h 48 m. The brightness of the radiation undergoes a time variation which is markedly similar at the two stations. The hypothesis that the variation is primarily a function of local time is supported. The observations indicate that the emitting region produces different integrated brightnesses when viewed from different directions suggesting that it is not a symmetrical layer at a constant height. The observations near the middle of the night can be explained in terms of an asymmetrical fold in an emitting layer. In Pt. 2, p. 186–196 (by Edward Manring), a study is made of the temporal variation in intensity of nightglow [OI] 5.577 at two observing stations in the southwestern part of the United States. The stations are separated by 0 h 48 m in long, and 3°18′ in lat. A general feature of all the nights of observation at both stations is the occurrence of an intensity maximum on the average two hours before midnight. The general variation resulting in this maximum is a function of the local time. Sporadic changes in intensity are superimposed on the diurnal variation. *Subject Headings:* **1. Night airglow 2. Spectral line 5577 Å [OI].**—*Authors' abstract.*

1955

8B–114 535.33:551.521.326

Berthier, Pierre, **Variations d'intensité post-crépusculaires et nocturnes des bandes de OH et O_2 du proche infrarouge.** [Variations of post-twilight and nocturnal intensity of the OH and O_2 bands in the near infrared.] *Académie des Sciences, Paris, Comptes Rendus*, 240(19):1919–1921, May 9, **1955.** 5 refs. **DLC**—A spectrophotometric study of variations in the intensity or OH bands leads to a discrimination between a very distinct post-twilight pattern and the usual nocturnal pattern. For atmospheric O_2 the intensification at the end of twilight is not always present. This result as well as the pattern of nocturnal variations support the assumption of a similarity between this emission and that of the green line of OI. *Subject Headings:* **1. Twilight spectra 2. Night airglow spectrum.**—*Trans. of author's abstract.*

8B–115 551.521.326

Berthier, Pierre, **Variations saisonnières de l'intensité des bandes de molécules OH and O_2 atmosphérique dans la luminescence du ciel nocturne.** [Seasonal variations of intensity of the molecular bands of atmospheric OH and O_2 in night airglow.] *Académie des Sciences, Paris, Comptes Rendus*, 240(18):1796–1798, May 2, **1955.** fig., refs. **DLC**—Spectrophotometry of near i.r. spectra of the nightglow reveals characteristic differences in the seasonal intensity variation of the OH and O_2 bands. For OH there appears a single maximum in winter, with a minimum in summer; resembling the seasonal fluctuation for atmospheric NA emission. By contrast, the much less regular seasonal curve for O_2 exhibits four maxima, suggesting a connection with the co-variant Herzberg O_2 bands and the [OI] green line. *Subject Headings:* **1. Seasonal emission spectra variations 2: Oxygen bands 3. Spectrophotometric observation.**—*Physics Abstracts, No. 6651, Aug. 1955.*

8B–116 535.24:551.521.326

Blamont, Jacques-Émile and Courtès, Georges (*both, Obs. de Haute-Provence*), **Nouveau procédé d'étude photométrique des émissions monochromatiques du ciel nocturne.** [New method for the photometric study of monochromatic emissions of the night sky.] *Annales de Géophysique*, Paris, 11(2):252 254, April/June **1955.** 4 figs., table, 3 refs. **DLC**—Photometer is described and its use explained in detail. Results of exposures made at night in Sept. 1951 at Haute-Provence Observatory are described, tabulated and illustrated by means of photographs and curves derived therefrom. Heights of the order of 300 km were obtained for the red rays. *Subject Headings:* **1. Night airglow photometry 2. Emission spectra 3. Haute Provence Observatory, France.**—*M.R.*

8B–117 551.521.326:535.33

Chamberlain, Joseph W. and Roesler, Frederick L. (*both, Yerkes Obs.*), **The OH bands in the infrared airglow.** *Astrophysical Journal*, Chicago, 121(2):541–547, March **1955.** 2 figs., 4 tables, 16 refs., 2 eqs. **DLC**—A series of infrared airglow spectra have been made at 70 A/mm, in order to obtain accurate wave lengths of the high-excitation ($v'=8$ and 9) Meinel OH bands. Band origins have been measured with a very small probable error, and the agreement between the airglow 6-2 and 5-1 bands with earlier high-dispersion measurements in the laboratory indicates that there are no appreciable systematic errors such as plagued previous airglow measurements. In order to represent accurately all energy levels up to $v=9$, it is necessary to use five termins in the usual power series involving ω_e, $\omega_e x_e$, etc. These vibrational levels are discussed, and a possible blending of airglow lines with O_{II} in the infrared auroral spectrum is pointed out. (*Same item as* 7.4–174, April 1956, *MAB.*) *Subject Headings:* **1. Night airglow infrared spectrum 2. OH emission bands.** —*Authors' abstract.*

8B–118 551.521.326:534

Donahue, T. M. and Foderaro, A. (*Univ. of Pittsburgh*), **The effect of resonance absorption on the determination of the height of airglow layers.** *Journal of Geophysical Research*, 60(1):75–86, March **1955.** 5 figs., 18 refs., 46 eqs. **DWB**—The theory of the self-absorption of resonance photons within a luminescent airglow layer is developed and expressions obtained analogous to the Van Rhijn equation for the variation of intensity as a function of zenith angle. The measured flux is shown to be a function of $L_o/\sqrt{T}$, where L_o is the vertical thickness in atoms/cm^2 and T the absolute temperature of the layer. The attenuation at large zenith angles in the case of the sodium D lines is shown to be large enough when L_o is between 1 and 2×10^{10} cm^{-2} and T between 160° and 220° to cause a layer at 70 km to simulate a non-absorbing (Van Rhijn) layer between 200 and 300 km. If self-absorption is important, it is shown that the ratio of D_1 to D_2 intensity should vary with zenith angle and different apparent heights found for the two components. Accurate measurements of L_2 and T are shown to be necessary for even good approximate height deductions where resonance radiation (for example, Na and OI) is concerned. (*Same item as* 6.9–179, Sept. 1955, *MAB.*) *Subject Headings:* **1. Night airglow 2. Emission-layer heights 3. Resonance absorption.**—*Authors' abstract.*

8B–119 551.521.326

Dufay, Jean and Tcheng, Mao-Lin, **Sur l'altitude des couches atmosphériques émettant les raies [OI] 5577 Å, [OI] 6300 Å et NaI 5892 Å.** [On the height of the atmospheric layers emitting the [OI, 5577 Å, [OI] 6300 Å and NaI 5892 Å lines.] *Annales de Géophysique*, Paris, 11(4):387–398, Oct./Dec. **1955.** 4 figs., 4 tables, 15 refs., numerous eqs. English summary p. 387. **DLC**—Earlier measurements made by the authors (1940–1944) are re-analyzed by introducing a new correction. Accounting only for the molecular scattering and for the absorption by atmospheric ozone, the following equivalent heights are obtained: $\lambda=5577$ Å, $z\cong195$ km; $\lambda=5892$ Å, $z\cong200$ (or 230) km; $\lambda=6300$ Å, $z\cong280$ km. These heights may be reduced to 170, 170 (or 200) and 250 km, respectively, if a thin layer of haze is present in the low atmosphere, producing, at the zenith, the additional optical density $D_0(v)=0.0050$. Possible errors arising from a selective absorption by water vapor and by oxygen molecules and particularly from the emission of the OH band are briefly considered. *Subject Heading:* **1. Night sky brightness 2. Emission layer heights.**—*From authors' abstract.*

8B–120 551.594.5 551.521.326

Elvey, C. T. (*Dir. Geophy. Inst., Alaska Univ.*) and Roach, Franklin E. (*Nat. Bur. of Standards, Wash., D.C.*), **Aurora and airglow.** *Scientific American*, N. Y., 193(3):140–150, Sept. **1955.** photos, figs. **DWB, DLC**—In this popular review paper, the authors discuss the geographical distribution of auroras, the development of auroral displays as seen in Alaska, instruments used in investigating auroras such as the "all sky camera," spectrograph, radio and radar, magnitude of auroras, the phenomenon of "airglow," including the green light of the glow and nightglow. Nightglow maps

indicating light pattern of the ray, photographs of auroral displays and breakup and a map showing the maximum frequency of the aurora are presented. *Subject Headings:* **1. Auroras 2. Night airglow 3. Alaska.**—*I.L.D.*

8B–121 551.521.326

Galbraith, W. and Jelley, J. V., **Light-pulses from the night sky and Čerenkov radiation, Pt. I.** *Journal of Atmospheric and Terrestrial Physics*, 6(5):250–262, May **1955.** 4 figs., 2 plates, 2 tables, 9 refs., 8 eqs. Also: Jelley, J. V. and Galbraith, W., **Pt. 2.** *Ibid.*, 6(6):304–312, June **1955.** 5 figs., 2 tables, 10 refs. **DWB**—The properties of night sky radiation were investigated on moonless nights on the Pic du Midi. Apparatus is described, including polarization experiments, directional properties of the light and experiments with color filters. It is concluded that part at least of the light detected is Čerenkov radiation and arises in the cores of air showers where the density of particles is high. Čerenkov radiation is described in the Appendix. Pt. 2 describes further experiments on the Pic du Midi. The height distribution of the light pulses above height H was $N(>H) \propto H^{-1.6}$; they fall off much more sharply than night sky noise. Firing of a Geiger counter falls off slowly with distance up to 120 m from the light receiver. Variations of light pulses with zenith and azimuth angles and with time were examined; no point sources were found. (*Same item as* 6.10–161 and 6.10–162, Oct. 1955, *MAB.*) *Subject Headings:* **1. Čerenkov radiation 2. Night sky emission theories 3. Pic du Midi, France.**—*C.E.P.B.*

8B–122 551.521.326:535.33

Gush, H. P. and Jones, A. Vallance, **Infrared spectrum of the night sky from 1.0μ to 2.0μ.** *Journal of Atmospheric and Terrestrial Physics*, 7(4/5):285–291, Oct. **1955.** 6 figs., 11 refs. **DWB**—The night sky spectrum has been extended from 1.0 to 2.0μ at Saskatoon, using a PbS cell and a special spectrometer. A typical average spectrum is shown, and one with higher resolution of the maximum between 1.5 and 1.68μ. This was compared with synthetic spectra of the OH rotation-vibration bands at 260° and 200°K. Good qualitative agreement is found with that for 200°K. (*Same item as* 7.3–176, March 1956, *MAB.*) *Subject Headings:* **1. Night airglow infrared spectrum 2. Saskatoon, Canada.**—*C.E.P.B.*

8B–123 551.521.326

Herman, Louis and Herman, Renee, **Le spectre du ciel nocturne dans le rouge, Pt. 1, Structure de la bande (c,I) du système de vibration-rotation de la molécule OH.** [The red spectrum of the night sky, Pt. 1, Structure of the (c, I) line of the vibration-rotation system of the OH molecule.] *Académie des Sciences, Paris, Comptes Rendus*, 240(13):1413–1414, March 28, **1955.** 5 refs. **BDW**—By means of a new diffraction (reflection-type) grating spectrograph new rays of OH molecules were observed in the night sky. The measured wave lengths are compared with those calculated from laboratory data. *Subject Heading:* **1. Red spectrum of night airglow.**—*Trans. of author's abstract.*

8B–124 551.521.326(52)

Huruhata, Masaaki, **Photoelectric studies of the night sky light, Pt. 2.** *Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan*, 4(3):137–146, **1950.** 8 figs., 4 tables, 12 refs. Also his: **Pt. 3.** *Ibid.*, 6(1):31–35, **1952.** 3 figs., 2 tables, 2 refs. Also: Huruhata, Masaaki; Tanabe, Hiroyoshi and Nakamura, Tsuyoshi, **Pt. 4.** *Ibid.*, 9(3):136–147, Sept. **1955.** 15 figs. (incl. photos), 6 tables, 8 refs. **DLC**—Pt. I (unchecked) reported on the observations made during 1943–45. Pt. II discusses the horizontal shifting of the night sky light based on observations of the infrared radiation made in 1949. This shifting (observed on many nights) was usually from north to south at a speed of about 1000 km/hr. Pt. III is a report on the study of the horizontal drift of the night sky by observation of the infrared radiation over the whole sky. Pt. 4 deals with observations of the 5577 Å emission in the whole sky carried out since the fall of 1953 at 2 stations—one on the Izu Peninsula and the other at Hokkaido, 1100 km distant. The purpose of these observations was to study: 1) the drifting of the night airglow in a wider area and 2) the height of the emitting layer by triangulation. The drifting of the night airglow was noted on very nearly every night on which observations were made. One height of nearly 300 km was obtained by triangulation. *Subject Headings:* **1. Night airglow drifting 2. Emission layer heights 3. Japan.**—*From authors' abstract.*

8B–125 551.521.326

Pettit, Helen B. and Manring, Edward (*U. S. A. F. Cambridge Res. Center*), **Intensity variations of [OI] 5577 and sodium D in the nightglow.** *Annales de Géophysique*, Paris, 11(4):377–386, Oct./Dec. **1955.** 5 figs., 4 tables, 9 refs. **DLC**—From Aug. 1953 to Jan. 1955 an automatic photoelectric photometer has been in operation at Sacramento Peak, N. Mex. (lat. N 32°48′, long. W 105°48′, and elevation 9250 feet). Observations were made of [OI] 5577 and sodium D in the nightglow. The results of this study show: (1) The diurnal variation in intensity of [OI] 5577

takes three forms. About 54% of the nights have a maximum near midnight as normally observed by stations in mid-latitudes, 36% have a minimum near midnight as reported in the lower latitudes, and 10% have no appreciable fluctuation during the night. This seems to indicate that this latitude may represent a lower limit to a possible geographical zone of midnight nightglow maximum. (2) The sodium D observations at this station are remarkably similar to others made in mid-latitudes. (3) In comparing simultaneous observations made at two stations of different longitudes it is found that the average absolute intensities are much the same, but the diurnal variations are dissimilar in detail. *Subject Headings:* **1. Night airglow intensity variations 2. Sodium D line 3. Sacramento Peak, N. Mex.**—*Authors' abstract.*

8B–126 **551.521.326**

Roach, F. E. (*Central Radio Propagation Lab., Boulder, Colo.*) and Meinel, A. B. (*Yerkes Obs.*), **The height of the nightglow by the van Rhijn method.** *Astrophysical Journal*, Chic., 122(3):530–553, Nov. **1955.** 13 figs., 13 tables, 32 refs., 2 eqs. **DWB, DLC**—The several factors involved in the estimation of the location of the nightglow in the earth's upper atmosphere are discussed. These include the extinction and scattering in the lower atmosphere, the correction for the finite field of view of the photometer, and the allowance for contamination of the observations by integrated starlight and zodiacal light. The difficulty inherent in the inclusion of more than one upper-atmosphere emission by a single filter is discussed. Application is made to the evaluation of the heights of the emissions $(O_I)5577$, $(O_I)6300$, and Na_I 5893 based on averages of photometric observations for three complete nights at Cactus Peak, Calif. It is found that a significant upper-atmosphere component is included by a control filter at 5300 Å. Within the probable uncertainty of the extinction coefficients, upper and lower limits of the deduced heights are: 5300 (78, 43 km); 5577 (104, 62 km); 5893 (129, 108 km); 6300 (143, 116 km). The probable inclusion in the observations of a significant amount of OH means that the actual heights of the atomic emissions may be slightly greater than these mean heights for the composite emission. *Subject Headings:* **1. Emission layer heights 2. Van Rhijn method 3. Cactus Peak, Calif.**—*Authors' abstract.*

8B–127 **551.521.326**

Roach, F. E. (*Central Radio Propagation Lab., Boulder, Colo.*) and Meinel, A. B. (*Yerkes Obs.*), **Nightglow heights: a reinterpretation of old data.** *Astrophysical Journal*, Chic., 122(3):554–558, Nov. **1955.** 4 refs., 3 tables, 6 refs. **DWB, DLC**—Observations of the nightglow by Abadie, A. Vassy and E. Vassy in the green (5577 A) and red (6300 A+OH) are interpreted as due to the sum of radiation from (a) starlight and zodiacal light and (b) nightglow. The solution is in contrast with that obtained by Abadie, Vassy and Vassy, who suggest two atmospheric emitting layers, a brighter one at 1000 km and a fainter one below 100 km. *Subject Heading:* **1. Emission layer heights.**—*Authors' abstract.*

8B–128 **551.521.326:016**

†Roach, F. E. (*Nat. Bur. of Stand., Boulder, Colo.*), **A review of observational results in airglow photometry.** *Annales de Géophysique*, Paris, 11(2):214–231, April/June **1955.** 17 figs., 6 tables, 51 refs. **DLC**—Nature of night airglow, diurnal, seasonal, sunspot and height relationships are shown graphically in great detail and profusion. Contains excellent bibliography on night airglow and zodiacal light. Articles are based on Naval Ordnance Test Station program 1949–54. *Subject Headings:* **1. Night airglow photometry 2. Night airglow bibliographies 3. Zodiacal light bibliographies.**—*M.R.*

8B–129 **551.521.326:551.508**

St. Amand, Pierre (*U. S. Nav. Ordnance Test Station, China Lake, Calif.*), **Instrumentation for nightglow research.** *Annales de Géophysique*, Paris, 11(4):435–449, Oct./Dec. **1955.** 7 figs., table, 13 refs., 7 eqs. **DLC**—The general problem of photoelectric observation of the night airglow is discussed. The physical, optical and electronic aspects are discussed and the design of a new telescope for nightglow measurements is described. Suggestions for instruments suitable for use during the Geophysical Year are made. *Subject Heading:* **1. Night airglow instrumentation.**—*Author's abstract.*

8B–130 **551.521.326**

St. Amand, Pierre; Pettit, Helen B.; Roach, F. E. and Williams, D. R., **On a new method of determining the height of the nightglow.** *Journal of Atmospheric and Terrestrial Physics*, 6(4):189–197, April **1955.** 5 figs., 3 tables, 2 refs. **DWB**—A new method of determining the height of the airglow by finding the height of intersection of 10° strips from two stations which gave the best accord (λ5577) was applied to Cactus Peak and Mt. Palomar. The height determined was 80–100 km. *Subject Headings:* **1. Night airglow 2. Emission layer heights.**—*C.E.P.B.*

8B–131 551.521.326:551.510.535

St. Amand, Pierre (*U. S. Nav. Ordnance Test Station, China Lake, Calif.*), **Some possible relations between the nightglow and the ionosphere.** *Annales de Géophysique*, Paris, 11(4):450–460, Oct./Dec. **1955.** 6 figs., 17 refs., eqs. **DLC**—Ionospheric data from Stanford, Calif., is compared with nightglow data from Cactus Peak, Calif. The nocturnal variation of the brightness of the green line, 5577, of [OI] is found to be similar to the variation of height of the F region. The nocturnal variation of the brightness of the red lines 6300–6364 of [OI] is found to be similar to that of the electron density of the F region. The possibility that the red lines are produced by radiation following dissociative recombination of electrons with O_2^+ ions is discussed. *Subject Headings:* **1. Night airglow-ionosphere relationships 2. Night airglow theories.**—*Author's abstract.*

8B–132 551.521.326:537.351:546.293

Spicer, William E. (*Dept. Physics, Missouri Univ.*), **X-ray-induced luminescence from air.** *Physical Review*, N. Y., Ser. 2, 98(4):1061–1062, May 15, **1955.** table, 4 figs. **DLC**—The luminescence due to the absorption of x-rays in air has been studied in the range 600 to 250 mμ. Relatively strong peaks were found at 356, 336, and 314 mμ with lesser peaks at 388, 378, and 373 mμ. This luminescence has been associated with argon present in the atmosphere. *Subject Headings:* **1. Night airglow 2. X-radiation 3. Argon.**—*Author's abstract.*

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8B–133 551.521.326(08) 551.594.5(08)

†The airglow and the aurorae: a symposium held at Belfast in September 1955. Ed by E. B. Armstrong and A. Dalgarno. London, Pergamon, **1956.** 420 p. figs., tables, refs., bibliogs., eqs. *Journal of Atmospheric and Terrestrial Physics, Special Supplements*, Vol. 5. **DWB**—A collection of papers presented at an international symposium held at Queen's University at Belfast on Sept. 6 and 7, 1955 under the chairmanship of S. CHAPMAN. The papers presented include 17 on airglow observations, 3 on auroral observations, 12 on theoretical considerations on airglow and auroras, 7 on laboratory studies, 7 on quantal calculations and 8 on instrumentation. The detailed contents of the volume are listed in Pt. 3, p. 252 of this issue of *MAB*. All the papers dealing with airglow are abstracted separately in this bibliography. *Subject Headings:* **1. Airglow symposia 2. Aurora symposia.**—*G.T.*

8B–134 551.521.326

Armstrong, E. B. (*Physics Dept., Queen's Univ., Belfast*), **A note on the diurnal variation of the OH emission in the nightglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 63–66. fig., 7 refs.) **DWB**—Some observations on the diurnal variation of the night airglow OH emission are presented and discussed. *Subject Headings:* **1. Diurnal emission spectra variations 2. Hydroxyl emissions.**—*Author's abstract.*

8B–135 551.521.326

Armstrong, E. B. (*Physics Dept., Queen's Univ., Belfast*), **The observation of line profiles in the airglow and aurora with a photoelectric Fabry-Perot interferometer.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 366–373. 4 figs., 8 refs., eqs.) **DWB**—Preliminary observations of the nightglow [OI] green line with a photoelectric Fabry-Perot interferometer are described. The temperature observed in a quiet auroral arc appeared to be in the neighborhood of 370°K. *Subject Headings:* **1. Photoelectric observation 2. Spectral line 5577 A [OI].**—*Author's abstract.*

8B–136 551.521.326

Bagariatskii, B. A. and Fedorova, N. I. (*both, Geophysical Inst. Acad. of Sci., Moscow*), **Spectra of the aurora and night-airglow in the infra-red region up to 11,800 A.** (In: **The airglow and the aurorae: a symposium.** London, Pefgamon, **1956.** p. 174–177, 2 figs., 9 refs.) **DWB**—Spectra of aurorae obtained with an infrared image converter in conjection with a grating spectrograph show that at wave lengths greater than 9000 Å, the Meinel N_2+ system is the only feature revealed by short exposures. It is tentatively suggested that the vibrational numbering given to the N_2+ bands by MEINEL and DOUGLAS may require revision, as there is no indication of a zero band at about 11,100 Å on the spectrograms obtained up to the present. An anomalous increase in intensity in the *P* branch of the (4,1) OH band in the night airglow during intense auroral displays is thought to be due to some additional emission, possibly the $(^2D - ^2P)$ lines of [NI] at 10,398 Å and 10,407 Å *Subject Headings:* **1. Night airglow infrared spectrum 2. Auroral spectra.**—*Authors' abstract.*

8B–137 551.521.32

Barbier, Daniel (*Inst. d'Astrophysique, Paris*), **Examen des méthodes de détermination d l'altitude des couches qui emettent la luminescence nocturne.** [Examination of methods of de termination of the altitude of layers which emit nocturnal luminescence.] (In: **The airglow an the aurorae: a symposium.** London, Pergamon, **1956.** p. 9–19. 3 figs., 14 refs., eqs. Englis summary p. 9.) **DWB**—The uncertainties involved in extinction on the one hand and extra-ter restrial light on the other are not in themselves sufficient to change, from about 200 km to 250 km the height of the layer emitting the green line, as obtained by the van Rhijn method. A critica examination of this method, considering in particular the effects of an inclination of the layer wit respect to the earth's surface, does not favor a serious systematic error in height, as deduced fro an extended series of observations. Nevertheless, observations are described which show tha difficulties in the interpretation of the van Rhijn method exist at least in the case where the analysi is based on the results of a single night. Finally, the possibility of determining altitudes by tri angulation is briefly examined. *Subject Headings:* **1. Emission layer height determination 2. Va Rhijn method.**—*Author's abstract.*

8B–138 551.521.32

Barbier, Daniel (*Inst. d'Astrophysique, Paris*), **Resultats préliminaires d'une photométrie e huit couleurs de la lumière du ciel nocturne.** [Preliminary results of photometry in 8 colors of th night sky light.] (In: **The air glow and the aurorae: a symposium.** London, Pergamon, **1956** p. 38–59. 17 figs., 5 tables, 12 refs., eqs. English summary p. 38.) **DWB**—Observations of th principal night sky emissions made with an eight-color photoelectric photometer are described Measurements are corrected for extra-terrestrial light, and are expressed in absolute units. Absolut mean values, seasonal variations, and diurnal variations of the intensities of some of the emission are given. Correlations have been studied, one group including the green line of [OI] and th Herzberg bands, and another the sodium emission and OH bands. The [OI] red lines appear to b unconnected with the other emissions. From the study of variations in the green line groups i seems that one might be able to deduce the presence of a continuum of atmospheric origin whos intensity would pass through a maximum in the green region of the spectrum, and which would no correlate with any of the other emissions, but would show an important precrepuscular effect *Subject Headings:* **1. Night airglow photometry 2. Night airglow intensity variations.**—*Author' abstract.*

8B–139 551.521.326:551.507.36

Berg, O. E.; Koomen, M.; Meredith, L. and Scolnik, R. (*all, Naval Res. Lab., Wash., D. C.*) **The altitude of the (OI) 5577 Å line in the night airglow measured from a rocket.** *Journal of Geo physical Research*, Wash., D. C., 61(2, Pt. 1):302–303, June **1956.** fig., foot-ref. **DLC**—The firs successful observations of the airglow luminosity in the 5577 Å band as a function of zenith angl and altitude were made at 2:00 a.m. MST on Nov. 17, 1955 at White Sands, N. Mex., with a Aerobee Rocket. Results for zenith angle 65° are shown as a function of altitude from 75 to 105 km Peak luminosity lay between 90 and 95 km. Background luminosity at 5200 Å was subtracte from 5577 measurements to get 5577 only, and all three curves shown on graph (*see* 8B–150). *Subjec Headings:* **1. Night airglow distribution with height 2. Rocket airglow data 3. Spectral line 5577 [OI] 4. White Sands, N. Mex.**—*M.R.*

8B–140 551.521.326:535.24

†Berthier, Pierre, **Étude spectrophotométrique de la luminescence nocturne des bandes de molécules OH et O_2 atmosphérique.** [Spectrophotometric study of night sky glow in the OH an O_2 atmospheric bands.] *Annales de Géophysique*, Paris, 12(2):113–143, **1956.** 17 figs., 9 tables 53 refs. French and English summaries p. 113. **DLC**—This present work is a spectrophotometri study of the night sky glow in the near infrared (OH and O_2 atmospheric bands). A preliminary part deals with the instrumental work and the use of the plates after their treatment, the photometri curves and the accuracy of the data. The study is divided in three parts: 1) the diurnal and seasona variations of the light intensity in the bands, 2) the correlation between different components of th night sky glow, and 3) the mean altitude of the emittive layers. *Subject Headings:* **1. Spectrophoto metric observations 2. Night airglow intensity variations 3. OH emission bands.**—*Author' abstract.*

8B–141 551.521.32

Berthier, Pierre and Morignat, Bernard (*both, Observatoire de Haute-Provence, France*), **Variation d'intensité des raies 6300, 5890, et 5577 Å et des bandes rouges de OH au cours de quelques nuit et rapport des intensités des raies 6300 et 5577 Å de OI.** [Variations of intensity of 6300, 5890, an 5577 Å rays and of the OH red lines during several nights and a report of the intensity of 6300 an

5577 Å rays of [OI].] (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 60–62. 6 figs., 5 refs. English summary p. 60.) **DWB**—Results of spectrophotometric measurements in the visible region are given. The curves indicate the variations during various nights of the line emissions at 5577, 5890, and 6300 Å on the same scale of intensity, and of the OH bands at 6240 Å. They also provide the ratio of the 6300 and 5577 Å lines of [OI]. The ratio, which decreases in the beginning of the night on account of the decrease of the post-crepuscular effect of the red lines, becomes stabilized afterwards at an approximate mean value of 0–2. *Subject Headings:* **1. Night airglow intensity variations 2. Nocturnal variations of night airglow.**—*Authors' abstract.*

8B–142 551.521.326

Cabannes, Jean and Dufay, Jean (*both, Laboratoire des Recherches Physiques de la Sorbonne et Observatoire de Haute Provence*), **Étude interferentielle des raies rouges du ciel nocturne.** [Interferential study of red rays of the night sky.] (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 73–85. 5 figs. (incl. photos), 6 tables, 14 refs., 4 eqs. English summary p. 73.) **DWB**—The wavelengths of the [OI] red lines in the airglow and twilight have been measured using the interference étalons of FABRY and PEROT. The results are 6300.308±0.004 Å and 6363.790±0.0045 Å. Preliminary measurements of the width of †6300 Å are also described. *Subject Headings:* **1. Red emission lines 2. Fabry-Perot interferometer.**—*Authors' abstract.*

8B–143 551.521.326

Dufay, J.; Berthier, P.; Dufay, M. and Morignat, B. (*all, Observatoire de Haut-Provence, France*), **Méthode de mesure spectrographique continue de l'intensité des raies brillantes du ciel nocturne.** [Method of continuous spectrographic measurement of the intensity of brilliant rays of the night sky.] (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 351–354. 5 figs. (incl. photos), 2 refs.) **DWB**—A method is described whereby the intensities of the main features in the twilight and night-airglow spectra may be continuously recorded photographically, by moving the plate in a large spectrograph at a uniform rate parallel to the spectrum lines. A subsidiary arrangement calibrates the plates. Some observations made with the instrument are presented. *Subject Headings:* **1. Spectrographic measurement of night airglow 2. Recording spectrography.**—*Authors' abstract.*

8B–144 551.508:551.521.326:535.33

Dunn, R. B. and Manring, E. R. (*both, Upper Air Research Observatory, Sunspot, N. M.*), **Recording night sky photometer of high spectral purity.** *Optical Society of America, Journal,* 46(8):572–577, Aug. **1956.** 7 figs. (incl. photos), table, 6 foot-refs. **DWB, DLC**—A recording night sky photometer which surveys the sky in 3 min 53 sec and possesses high spectral purity has been constructed and is in use at Sacramento Peak, N. Mex. The photometer is used to record the night emission lines at 5577, 5890 and 6300 Å. It employs three interference filters 6 in. in diameter, of about 15 Å band width, of about 75% transmission, and centered upon the above emission lines. It also employs a single element quartz birefringent filter used to modulate the emission lines. This arrangement of filters was first employed by BLAMONT and KASTLER and has been effectively used by KOOMEN et al. The ac signal in the photomultiplier is then proportional to the emission intensity. This combination of filters provides high spectral purity and corresponding freedom from the effects of continuum in the vicinity of emission lines. *Subject Headings:* **1. Night airglow photometers 2. Recording photometers 3. Photometric emission measurement.**—*Authors' abstract.*

8B–145 551.521.326:535.24

Elsässer, H. and Siedentopf, H. (*both Astronomical Institute of the Univ. of Tübingen, Germany*), **The height of the layer emitting [OI]-5577 in the night-airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 27–28. 2 refs., eqs.) **DWB**—An automatic photoelectric photometer is described which was used to determine the height of the [OI]-5577 emission by the van Rhijn method. Extinction coefficients were measured on each observing night with a stellar photometer. Values obtained for the mean emission height were 72±10 km for the northern side and 112±13 km for the southern side of the sky, the latter being considered more reliable. *Subject Headings:* **1. Emission layer heights 2. Height of spectral line 5577 A [OI] 3. Night airglow photometry.**—*Authors' abstract.*

8B–146 551.521.326

Gaydon, A. G. (*Imperial College, London*), **A laboratory source of the Herzberg bands of O_2.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 262–263. 5 refs., eqs.) **DWB**—The spectrum of the afterglow of pure oxygen, produced in a relatively simple discharge, consists of the Herzberg system of O_2, lying mainly in the region 2600–4300 Å. A new progression has been found, which necessitates a slight revision of HERZBERG's original vibrational

analysis. Other features in the spectrum include the 5577 Å green auroral line and the atmospheric band of O_2 at 7593 Å. A new intercombination system has been discovered, whose bands have the same initial state as those of the Herzberg system, so that it should be present in the nightglow. *Subject Headings:* **1. Night airglow simulation 2. Herzberg bands of O_2.**—*Author's abstract.*

8B–147 551.521.326

Huruhata, M.; Tanabe, H. and Nakamura, T. (*all, Tokyo Astronomical Observatory*), **Photoelectric study of the night-airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 20–26. 7 figs. (incl. photos), 3 refs.) **DWB**—Simultaneous observations of the [OI]-5577 Å emission in the night airglow are described, and by a triangulation method a height of 270 km is obtained for the emitting layer. A second method, involving the comparison of the mean intensities of regions observed simultaneously, gives a height of about 300 km. Correlation of the emission intensity with the electron density in the F2 layer is fairly strong on some nights only. *Subject Headings:* **1. Emission layer heights 2. Spectral line 5577 Å [OI].**—*Authors' abstract.*

8B–148 551.521.326

Karandikar, R. V. (*Laboratoire de Physique de l'atmosphere, Faculté des Sciences, Paris*), **Use of a recording Fabry-Perot interferometer for the measurement of λ5577 Å emission temperatures in the airglow and aurorae.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 374–387. fig., 2 tables, 36 refs., eqs.) **DWB**—Previous photographic work on the use of the Fabry-Perot étalon to measure the temperature of the green line emission layer in the night airglow or the aurora is briefly reviewed. The feasibility of the application of a recording Fabry-Perot interferometer developed by JACQUINOT and DUFOUR to such measurements is then discussed in detail. On the basis of previous evidence and other considerations regarding the width of the green line, a set of instrumental parameters insuring maximum luminosity for a given resolution is suggested, and from the known nightglow and auroral intensities, estimates of the flux available at the exit slit and the chances of its photoelectric detection with a given precision are evaluated. It appears that rather small photocurrents would be involved in the nightglow work, and the success of the method would depend upon how well these could be measured. With the much higher intensities of the aurorae, there are good chances of the method being successfully used for temperature measurements over fixed portions of an auroral display or for making rapid surveys across the homogeneous quiet arc and other auroral forms. *Subject Headings:* **1. Green emission layer temperature 2. Fabry-Perot interferometer.**—*Author's abstract.*

8B–149 551.521.326:523.78

Koomen, M. J.; Lock, C.; Packer, D. M. et al. (*all, U. S. Naval Research Lab., Wash., D. C.*), **An attempt to measure some airglow emissions during a solar eclipse.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 135–141. 6 figs., 4 refs.) **DWB**—Measurement of the 5577 Å and 6300 Å airglow emission lines was attempted during the total solar eclipse of 30 June 1954, at Fairplay, Colo., altitude 10,000 ft, and located on the fictitious centre line. During totality the sun was depressed 6° below the horizon. The photometer described elsewhere by KOOMEN, PACKER, and TOUSEY, was aimed along the intersection of the plane swept out by the cone of totality and the plane at right angles to the direction to the sun. Due to clouds the experiment virtually failed; however, the 5577 Å line was measured through the clouds until the end of totality. After correction for the attenuation due to clouds, the intensity of the line showed no changes that could be attributed to the changing solar illumination of the earth's atmosphere. *Subject Headings:* **1. Night airglow-eclipse relationships 2. Spectral line 5577 Å [OI] 3. Eclipse June 30, 1954. I. Scolnik, R. II. Tousey, R.**—*Authors' abstract.*

8B–150 551.521.326:546.33

Koomen, M.; Scolnik, R. and Tousey, R. (*U. S. Naval Res. Lab., Wash., D. C.*), **Distribution of the night airglow (OI) 5577 Å and Na D layers measured from a rocket.** *Journal of Geophysical Research*, Wash., D. C., 61(2, Pt. 1):304–306, June **1956.** fig., 2 foot-refs. **DLC**—Rocket data on the 5577 Å line of [OI] and the Sodium D line in connection with night airglow are presented graphically for zenith angle of 70° along with data for 5300 Å continuum. The data were obtained at White Sands, N. Mex., on Dec. 12, 1955 at 10:00 p.m. MST, by means of simple photometers. Excellent data were obtained from 65 km to 141 km. The 5577 Å layer extends from 80 to 115 km and the Na D line from 70 to 95 km with centers of layers at 96 and 85 km, respectively. No airglow luminosity was found between 120 and 141 km. Processes accounting for the luminosity in these wavelengths are suggested, and agreement with BERG's (1956) (*see* **8B–139**) data for Nov. 17, 1955 noted. *Subject Headings:* **1. Night airglow distribution with height 2. Rocket airglow data 3. Sodium D line 4. Spectral line 5577 Å [OI] 5. White Sands, N. Mex.**—*M.R.*

8B–151 551.521.326:551.508.92

Koomen, M. J.; Packer, D. M. and Tousey, R. (*all, U. S. Naval Res. Lab., Wash., D. C.*), **The use of birefringent filters in measurements of the airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 355–365. 9 figs., 10 refs., eq.) **DWB**—A photometer is described that measures directly the intensity of a single emission line such as the 5577 Å emission of oxygen in the night or twilight airglow. No correction for the background continuum is required. The components of the filter are, an interference filter, a polarizer, a thick birefringent plate, a quarter-wave plate, an analyzer in continuous rotation, and a lens imaging the sky on a photomultiplier. The band pass of the filter is a continuously sliding channelled spectrum of 3.5 Å separation. Thus the line, but not the continuum, isolated by the interference filter, was modulated and amplified by a.c. methods. The use and capabilities of the instrument are discussed and some data on the night and twilight airglow are presented. *Subject Headings:* **1. Night airglow measurement 2. Night airglow photometers.**—*Authors' abstract.*

8B–152 551.521.326

Krasovskiĭ, V. I. (*Geophys. Inst., Academy of Sciences, Moscow*), **Infra-red night airglow as a manifestation of the process of oxygen recombination.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 193–196. 6 refs., eqs.) **DWB**—It is suggested that the infrared emissions in the nightglow arise through a process of recombination of atomic oxygen. *Subject Headings:* **1. Night airglow infrared spectrum 2. Atomic oxygen recombination.**—*Author's abstract.*

8B–153 551.521.326

Krasovskiĭ, V. I., **Izluchenie neba i poliarnykh siianiĭ. Iz programmy Mezhdunarodnogo geofizicheskogo goda.** [Airglow and auroral radiation: from the program of the International Geophysical Year.] *Akademiia Nauk SSSR, Vestnik,* 26(5):29–31, May **1956. DLC**—Trans. into English by E. R. Hope, issued as *Canada. Defence Research Board, T* 224 R, Aug. **1956.** 4 p. Mimeo. **DWB**—Outlines participation of the U.S.S.R. in the auroral and airglow program of IGY, consisting mainly of synoptic reporting of auroras and systematic airglow and auroral electrophotometry and spectrography. The airglow program will consist of hourly electrophotometric measurement of intensities of the principal oxygen, sodium and hydroxyl emissions at several stations during twilight and night; also spectrographic observation at various points, including an Arctic and an Antarctic location. Observations of zodiacal light will also be conducted with (among others) the anticipation of correcting airglow observations by eliminating the zodiacal light component. *Subject Headings:* **1. Night airglow program in IGY 2. U.S.S.R. participation in IGY.**—*G.T.*

8B–154 551.521.326

†Krasovskiĭ, V. I. (*Geophys. Inst. of the Academy of Sciences, Moscow*), **On the detection of the infra-red night-airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 86–90. 2 figs., 29 refs.) **DWB**—Work on the infrared night airglow emission carried out in the U.S.S.R. during the past ten years is briefly summarized. Recent observations in the infrared region up to 11,000 Å with an improved spectrograph have shown that at times when the hydroxyl emission is weak enough to allow long exposures, some diffuse emission and unidentified bands, tentatively ascribed to scattered starlight and sunlight, are apparent at wave lengths greater than 7000 Å. An unexplained intensity minimum has been observed near 9800 Å. Two lines appear in the region of the *P* branch of the (3–0) hydroxyl band which have not been identified finally as yet. *Subject Headings:* **1. Night airglow infrared spectrum 2. Hydroxyl emissions.**—*Author's abstract.*

8B–155 551.521.326

Krasovskiĭ, V. I. (*Geophys. Inst. of the Academy of Sciences, Moscow*), **Ozone-hydrogen hypothesis of the hydroxyl night-airglow.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 197–200. 11 refs., eq.) **DWB**—The identification of the reactions leading to emission of OH bands in the nightglow is discussed in detail. *Subject Heading:* **1. Hydroxyl emissions.**—*Author's abstract.*

8B–156 551.521.326

McKinley, J. D., Jr.; Garvin, David and Boudart, M. J. (*all, James Forrestal Res. Center, Princeton Univ.*), **The reaction of atomic hydrogen with ozone.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 264–269. 2 figs., table, 13 refs., 6 eqs.) **DWB**—Near infrared emission spectrograms of vibrationally excited hydroxyl radicals in the ground state have been obtained upon mixing H atoms and ozone. A recent interpretation of a particular source of the night sky radiation has been verified. A nonequilibrium distribution of energy between the

reaction products is indicated. The subsequent reactions between hydroxyl, oxygen, and atomic and molecular hydrogen have been studied. *Subject Heading:* **1. Hydroxyl emissions.**—*Authors' abstract.*

8B–157 551.521.326(789)(08)

Manring, Edward R. and Pettit, Helen B. (*both, Geophysics Res. Directorate, A. F. Cambridge Res. Center, Mass.*), **Observations of the [OI]-5577 nightglow at Sacramento Peak, New Mexico, February through June 1955.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 29–37. 5 figs., 3 tables, 13 refs., eqs.) **DWB**—[OI]-5577 in the nightglow has been observed at Sacramento Peak, N. Mex., (lat. 32°47′N, long. 105°48′W, and elev. 9250 ft) with a rapid surveying photometer, having a very high spectral purity. The intensity distribution is found to be much more uniform in position over the sky than previously reported. The observed intensity for any one night can, with considerable accuracy, be represented by the relation: $B(p,t) = B(p) \times B(t)$, where $B(p,t)$ is the brightness observed at position p, at time t; $B(p)$ is a function of position only; and $B(t)$ is a function of time only. The positional dependence, $B(p)$, was observed to change slowly and regularly throughout the period from February to June 1955. Deviations from this mathematical relation are essentially random in time and position. They are about 15 to 20% of the background. Careful measurements of van Rhijn ratios have been made. These are found to vary considerably from night to night and with season, so that definite conclusions concerning heights are impossible at this time. *Subject Headings:* **1. Spectral line 5577 A [OI] intensity variations 2. Night airglow photometry 3. Sacramento Peak, N. Mex.**—*Authors' abstract.*

8B–158 551.521.326

Nicodemus, Fred E.; Edwards, H. D. (*both, Geophysics Res. Directorate, A. F. Cambridge Research Center, Mass.*) and Ghosh, S. N. (*Wentworth Inst., Boston, Mass.*), **An experimental method for measuring the heights of luminescent layers in the atmosphere from a rocket by utilizing a biaxial pointing control.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 399–410. 2 figs., 4 tables, 12 refs., 2 eqs.) **DWB**—The van Rhijn method, used to measure the heights of emitting layers in the airglow with ground-based apparatus, suffers from uncertainties due to absorption and scattering of light by the gases in the dense lower atmosphere. These uncertainties can be avoided if measurements are carried out by a rocket-borne photometer or radiometer above the scattering layer (40 km). In the method described here, such measurements can be made by a photometer which is stabilized by means of the photoelectrically controlled arm (instrument case) of the biaxial pointing control. The height of the layer is measured by the variation, with rocket altitude, of the observed airglow intensity in a horizontal direction, even if the layer is far above the peak of the rocket trajectory. A rotating-plane mirror produces a slow conical scan (which has been adjusted to include the horizontal) at a fixed angle about the sun (moon). From the telemetered record of intensities, the horizontal signals are selected and then plotted to show their variation with rocket altitude. The height of the emitting layer is determined by the best match between the experimental curve and the theoretical curves for different heights. It is proposed that this method be used to measure the heights of oxygen 6300 Å and/or sodium 5894 Å lines in the day airglow and, if the pointing control can be modified for guidance by the moon, the height of Meinel OH bands (near infra-red) and/or oxygen 5577 Å could then be studied at night. *Subject Headings:* **1. Emission layer height determination 2. Rockets.**—*Authors' abstract.*

8B 159 551.521.326

Phillips, John G. (*Dept. of Astronomy, Univ. of Calif.*), **The determination of the widths of the airglow and twilight flash.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, **1956.** p. 67–72. 5 figs. (incl. photo). **DWB**—Observations made with a Fabry-Perot interferometer with multilayer dielectric coatings on the plates have given values for the Doppler widths of the [OI]-λ5577 and [OI]-6300 lines in the airglow and twilight flash respectively. The observed profile of the λ5577 line indicates a temperature of between 155°K and 231°K for the emitting region. The profile of the λ6300 line, observed in the twilight in Alaska, indicates a temperature of 750°K ±200°K. *Subject Headings:* **1. Spectral line width 2. Emission layer temperature.**—*Author's abstract.*

8B–160 551.521.326(02)

Roach, F. E. (*N. B. S., Boulder, Colo.*), **Manual for photometric observations of the airglow during the International Geophysical Year.** *U. S. National Bureau of Standards, NBS Report,* 5006, Aug. 20, **1956. DBS**—Forms, specifications, tables for calculation, definitions and description of instruments and methods of observation at the International Geophysical Year stations observing the night airglow uniform units, methods of calibration and corrections, and punched card forms for tabulation are specified. Several types of photometers in current use are described and spectral

observations of the OH nightglow discussed. These latter are considered important as data on OH spectra are rare. *Subject Headings:* **1. Night airglow photometry 2. Observers manuals 3. Night airglow observation 4. International Geophysical Year airglow manuals.**—*M.R.*

8B–161 551.521.326:551.508.92

St. Amand, P. (*Fulbright Scholar, Institut d'Astrophysique, Paris*), **A new type of nightglow-auroral photometer.** (In: **The airglow and the aurorae: a symposium.** London, Pergamon, 1956. p. 395–398. fig., 3 refs., eqs.) **DWB**—A new type of photometer intended for geophysical-year use is proposed. The response is proportional to the logarithm of the luminous intensity and the calibration is expected to be stable for a period of centuries. The device will find application for measurements of nightglow, aurora, twilight, day sky brightness, eclipse observations, and any other applications where the intensity of light can be expected to change by several orders of magnitude. *Subject Heading:* **1. Night airglow photometers.**—*Author's abstract.*

SUPPLEMENTARY MATERIAL

8B–162 523.75:523.62

Biermann, L. and ten Brüggencate, Paul, **Über die Ursache der hohen Temperatur der Sonnenkorona nebst einer Bemerkung über das Nachthimmellicht.** [On the cause of the high temperature of the solar corona with a remark on the light of the night sky.] *Akademie der Wissenschaften in Göttingen, Math.-Physik. Klasse, Math.-Physik.-Chem. Abt., Nachrichten,* No. 1:19–23, 1946. 15 refs., 6 eqs. **DWB**—The authors submit the hypothesis that interstellar matter causes not only the high temperature of the solar corona but also night airglow. The interstellar particles fall towards the earth or the sun and are stopped in the upper atmosphere or in the sun's corona respectively. *Subject Headings:* **1. Solar corona temperature 2. Night airglow.**—*A.A.*

PART III. REVIEWS, TRANSLATIONS, REPRINTS, ROUTINE DATA PUBLICATIONS, AND ANALYTICS FROM RECENT SERIALS AND COLLECTED WORKS

Note: Material listed in these sections will not be included in the monthly indexes until abstracted. The item number is mentioned for those titles which have been abstracted in previous issues of **Meteorological Abstracts and Bibliography.**

A. REVIEWS OF IMPORTANT METEOROLOGICAL MATERIAL

Australia. Meteorological Branch: **Climatological data for Melbourne with comparable data for Australian capital cities. . . .** Melbourne, 1955. 64 p. map, illus. Review by A. Rojecki in *Przegląd Geofizyczny*, Warsaw, 1(1):88–89, 1956. (*For review on the original, see* 8.1–314, Jan. 1957, *MAB*)

Bider, M.: **Klimatische Daten Basels für das praktische Leben** [Climatic data at Basel for practical use]. *Wirtschaft und Verwaltung*, No. 1:7–54, 1956 (issued by Statistisches Amt des Kantons Basel-Stadt). Review by F. Lauscher in *Wetter und Leben*, Vienna, 8(3/4):82, 1956.

British East Africa. Royal Commission, 1953–1955: **Report.** London, 1955. 482 p. maps. *Command Paper*, 9475. Price, 17 sh. 6 d. Review by R. W. Steel in *Geographical Journal*, London, 122(3):366–369, Sept. 1956.

Brooks, C. E. P.: **The English Climate.** With a foreword by Sir David Brunt. London, English Universities Press, 1954. 214 p. 27 figs. Price, 12s. 6d. Review by W. Mörikofer in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B.*, 7(3/4):480, 1956. (*See* 5.11–1, Nov. 1954, *MAB*)

Flohn, Hermann: **Witterung und Klima in Mitteleuropa** [Weather and climate in Central Europe]. Stuttgart, S. Hirzel, 1954. 2d ed. rev. 214 p. 33 figs., 9 tables, 538 refs. *Forschungen zur Deutschen Landeskunde*, Vol. 78. Review by C. C. Wallén in *Geografiska Annaler*, Stockholm, 38(1):113, 1956. (*See* 5.9–3, Sept. 1954, *MAB*)

Great Britain. Meteorological Office: **Handbook of meteorological instruments, Pt.1, Instruments for surface observations.** Its *M.O.* 577, 1956. 458 p. 132 figs., 53 plates (photos.), 57 tables, 80 refs., 91 eqs. Price, 45s. Review by A. W. Brewer in *Royal Meteorological Society, Quarterly Journal*, 82(354):545, Oct. 1956. (*See* 7.11–19, Nov. 1956, *MAB*). Review by O. M. Ashford in *World Meteorological Organization, WMO Bulletin*, 6(1):45–46, Jan. 1957.

Great Britain. Meteorological Office. Agricultural Branch: **Weather and the land.** *Great Britain. Ministry of Agriculture, Fisheries and Food, Bulletin*, No. 165, 1955. 35 p. 14 figs., 4 plates, 3 tables. Price, 3s. Review in *Royal Meteorological Society, Quarterly Journal*, 82(345):548, Oct. 1956. (*See* 7.10–54, Oct. 1956, *MAB*)

Grundke, Günter: **Die Bedeutung des Klimas für den industriellen Standort** [Importance of climate for industrial location]. *Petermanns Geographische Mitteilungen, Ergänzungsheft*, No. 255, 1955. 127 p. 22 figs., 30 tables, 256 refs. Review by H. E. Landsberg in *American Meteorological Society, Bulletin*, 37(10):549, Dec. 1956. Review by Jerzy Grzeszczak in *Przegląd Geograficzny*, Warsaw, 28(3):618–620, 1956. (*See* 6.8–12, Aug. 1955, *MAB*)

Hofmann, Alfred: **Probleme um die Wettervorhersage** [Problem of weather forecasting]. Stuttgart, Kosmos-Gesellschaft der Naturfreunde, 1955. 74 p. 25 figs. Price, DM 2.80. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):427, 1956. (*See* 8.1–12, Jan. 1957, *MAB*)

Kaiser, T. R., (ed.): **Meteors. Special supplement (Vol. 2) to the Journal of Atmospheric and Terrestrial Physics.** London, Pergamon Press, 1955. 204 p. 74 figs. Price, 55 sh. Review by D. R. Bates in *Science Progress*, London, 44(175):549–550, July 1956. (*See* 7.7–1, July 1956, *MAB*)

Khromov, Sergeĭ Petrovich and Mamontova, L. I.: **Meteorologicheskiĭ slovar'** [Meteorological glossary]. Leningrad, Gidrometeoizdat, 1955. 454 p. figs., 72 refs. Review by A. D. Zamorskii in *Vsesoiuznoe Geograficheskoe Obshchestvo, Leningrad, Izvestiia*, 88(5):474–475, Sept./Oct. 1956. Review by P. N. Tverskoĭ in *Meteorologiia i Gidrologiia*, No. 8:53–57, Aug. 1956. (*See* 7.8–10, Oct. 1956, *MAB*)

Ludlam, F. H. and Scorer, R. S.: **Further outlook.** London, Allan Wingate, 1954. 174 p. 25 figs., 13 plates. Price, 15 sh. Review by Catherine P. Snodgrass in *Scottish Geographical Magazine*, Edinburgh, 71(2):122–123, Sept. 1955. (*See* 6J–248, Oct. 1955, *MAB*)

Meetham, A. R.: **Atmospheric pollution: its origins and prevention.** 2d ed. London, Pergamon Press, 1956. 304 p. illus. Price, 63 sh. Review by P. J. Meade in *Meteorological Magazine*, London, 85(1013):348, Nov. 1956. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. B*, 7(3/4):483–484, 1956. (*See* 4.2–12, Feb. 1953, *MAB*) Review by O. M. Ashford in *World Meteorological Organization, WMO Bulletin*, 6(1):47, Jan. 1957.

Meteoros, Buenos Aires, Argentina, Vol. 5, No. 4, Oct./Dec. 1955. Review of contents with short abstracts, in *Pan American Union, Ciencia y Tecnologia*, 6(21):93–94, April/June 1956.

Miller, David H.: **Snow cover and climate in the Sierra Nevada, California.** *California. Univ., Publications in Geography*, Vol. 11, 1955. 218 p. 11 figs. Review by I. Küchle-Scheidemantel in *Petermanns Geographische Mitteilungen*, Gotha, 100(2):146–147, 1956. Review by C. C. Wallén in *Geografiska Annaler*, Stockholm, 38(1):112–113, 1956. (*See* 6.10–8, Oct. 1955, *MAB*)

Petterssen, Sverre: **Weather analysis and forecasting, Vol. 1, Motion and motion systems.** 2d ed. N. Y., McGraw-Hill, 1956. 428 p. 241 figs., 20 tables. Price, $8.50; 64 sh. Review by R. C. Sutcliffe in *Royal Meteorological Society, Quarterly Journal*, 82(354):543, Oct. 1956. (*See* 7.8–4, Aug. 1956, *MAB*). Review by M. A. Alaka in *World Meteorological Organization, WMO Bulletin*, 6(1):44–45, Jan. 1957. Review by J. M. Austin in *American Met. Soc., Bulletin*, 38(3):184–185, March 1957.

Schirmer, Hans: **Die raümliche Struktur der Niederschlagsverteilung in Mittelfranken** [Space structure of rainfall distribution in central France]. *Forschungen zur Deutsche Landeskunde*, Vol. 81, 1955. maps and figs. in supplement. Price, DM 6,35. Review by Joachim Blüthgen in *Erdkunde*, Bonn, 10(3):249, Aug. 1956.

Schultze, Joachim H.: **Beiträge zur Geographie Tropisch-Afrikas** [Contribution to the geography of tropical Africa]. *Leipzig, Deutsches Institut für Länderkunde, Wissenschafiliche Veröffentlichungen*, n.s., 13/14, 1955. 137 p. maps. Review in *Geographical Journal*, London, 122(3):381, Sept. 1956.

Tannehill, Ivan Ray: **Hurricanes: their nature and history, particularly those of the West Indies and the southern coasts of the U. S.** 9th rev. ed. Princeton Univ. Press, 1956. 308 p. 141 figs., tables, bibliog. Price, $4.50. Review by F. Steinhauser in *Archiv für Meteorologie, Geophysik und Bioklimatologie, Ser. A*, 9(3):427–428, 1956. (*See* 7.6–3, June 1956, *MAB*). Review in *Royal Meteorological Society, Quarterly Journal*, 83(355):138, Jan. 1957.

Townsend, A. A.: **The structure of turbulent shear flow.** Cambridge Univ. Press, 1956. 154 p. illus. Price, 40 sh. Review by F. Pasquill in *Meteorological Magazine*, London, 85(1014): 380–381, Dec. 1956.

B. TRANSLATIONS AND ROUTINE DATA PUBLICATIONS

Translations

Burgess, Eric: **Raketen in der Ionosphärenforschung** [Frontier to space]. Garmisch-Partenkirchen, Deutsche Radar-Verlagsgesellschaft, 1956. Price, DM 22. Trans. from original English by Walter Stanner. Review by G. R. Haake in *Zeitschrift für Meteorologie*, 10(5):159, May 1956. (*For abstract on original English, see* 6.10–5, Oct. 1955, *MAB*)

Feĭgel'son, E. M.: **O pogloshchatel'nykh svoĭstvakh vodianogo para i uglekislogo gaza v atmosfere** [Absorptive property of water vapor and carbon dioxide in the atmosphere]. [In] *Akademiia Nauk SSSR, Izvestiia, Ser. Geofizich.*, No. 2:69–79, Jan./Feb. 1955. 5 figs., 11 tables, 9 refs., eqs. Trans. into English by E. R. Hope. Issued as *Canada. Defence Research Board, T* 212 R, Aug. 1956. 5 figs., (etc.) (*See* 7.7–157)

Petitjean, Lucien: **La frontologie en Afrique du Nord** [Frontology in North Africa]. [In] *Beiträge zur Physik der freien Atmosphäre*, 19:163–172, 1932. Trans. by H. Landsberg, issued 1943. 8 p. photostat illus. 5 refs. typescript. (Available DWB) (*See* 3A–136)

Tverskoĭ, P. N.: **Grozovoe elektrichestvo i sokhranenie otritsatel'nogo zariada zemli** [Thunderstorm electricity and maintenance of the earth's negative charge]. *Leningrad. Universitet, Vestnik*, No. 6:3–23, 1947. 41 p. illus., tables, 51 refs. Trans. into English by Michael M. Dane and David Kraus. Issued by American Meteorological Society under Contract AF 19(604)-1364, July 13, 1955. illus. (etc.). (*See* 1–166, Jan. 1950, *MAB*)

Routine Data Publications

Germany. Deutscher Wetterdienst: **Jahresberichte, 1955** [Annual Report, 1955]. Its *Jahresberichte*, No. 3, 1956. 60 p. figs., tables. (*See* 6.11–36 *for* 1953 and 1954 *issues*)

Indonesia. Djawatan Meteorologi dan Geofisik, Djakarta: **Pilot balloon observations made in Indonesia, January–June 1953.** 6 pieces. loose-leaf. mimeog. (*See* 5B–153 Feb. 1954, *MAB for abstract on this title*)

Israel. Hydrological Service: **Hydrological Yearbook of Israel, 1952/1953.** pub. Jerusalem, 1955. 257 p. In Hebrew and English. Almost entirely graphs and tables. (*See* 6.9–272 for 1951/1952 *issue*)

Philippines. Weather Bureau: **Tropical Cyclones of 1955.** Prepared under direction of Casimiro del Rosario. 19 p. map, tables. (*See* 7I–149 *for* 1949–1953 *issues*)

U. S. Weather Bureau: **Climatological Data, National Summary, Vol. 6, No. 13, 1955 (Annual).** pub. Asheville, 1956. 108 p. 4 charts. Almost entirely tables. Also: **Vol. 7, No. 4, April 1956.** pub. 1956. (*See* 3.4–50 *for abstract on this title*)

C. METEOROLOGICAL ARTICLES APPEARING IN RECENTLY ISSUED PUBLICATIONS

The Air Glow and the Aurorae: a Symposium held at Belfast in Sept. 1955. Edited by E. B. Armstrong and A. Dalgarno. London & N. Y., Pergamon Press, 1956

Chapman, Sydney: **Achievements and prospects in auroral and airglow research,** p. 1–8

Barbier, Daniel: **Examen des méthodes de determination de l'altitude des couches que emettent la luminescence nocturne,** [Examination of methods of determination of the altitude of layers which emit nocturnal luminescence], p. 9–19

Huruhata, M.; Tanabe, H. and Nakamura, T.: **Photoelectric study of the night-airglow,** p. 20–26

Elsässer, H. and Siedentopf, H.: **The height of the layer emitting [OI]-5577 in the night-airglow,** p. 27–28

Manring, Edward R. and Pettit, Helen B.: **Observations of the (OI)-5577 nightglow at Sacramento Peak, New Mexico, February through June 1955,** p. 29–37

Barbier, Daniel: **Resultats preliminaires d'une photométrie en huit couleurs de la lumière du ciel nocturne,** [Preliminary results of photometry in 8 colors of the night sky light], p. 38–59

Berthier, Pierre and Morignat, Bernard: **Variations d'intensité des raies 6300, 5890, et 5577 Å et des bandes rouges de OH au cours de quelques nuits et rapport des intensités des raies 6300 et 5577 Å de OI,** [Variations of the intensity of 6300, 5890, and 5577 Å rays and of the OH red lines during several nights and a report of the intensity of 6300 and 5577 Å rays of OI], p. 60–62

Armstrong, E. G.: **A note on the diurnal variation of the OH emission in the nightglow,** p. 63–66

Phillips, John G.: **The determination of the widths of the airglow and twilight flash,** p. 67–72

Cabannes, Jean and Dufay, Jean: **Étude interferentielle des raies rouges du ciel nocturne,** [Interferential study of red rays of the night sky], p. 73–85

Krasovskii, V. I.: **On the detection of the infra-red night-airglow,** p. 86–90

Galperin, G. I.: **The ratio of the intensities of the components of the sodium doublet in the twilight spectrum,** p. 91–94

Harrison, A. W. and Jones, A. Vallance: **The intensity ratio of the *D* lines in twilight,** p. 95–98

Blamont, Jacques-Émile: **Observations de l'émission atmosphérique des raies *D* du sodium au moyen d'un appareil à balayage magnétique,** [Observations of atmospheric emission of sodium *D* rays by means of a magnetic balayage apparatus], p. 99–113

Hunten, D. M.: **Seasonal variations of twilight sodium emission,** p. 114–121

Edwards, Howard D.: Bedinger, John F. and Manring, Edward R.: **Emission from a sodium cloud artificially produced by means of a rocket,** p. 122–134

Koomen, M. J.; Lock, C.; Packer, D. M. et al: **An attempt to measure some airglow emissions during a solar eclipse,** p. 135–141

Roach, F. E. and Rees, M. H.: **The absolute photometry of the Gegenschein,** p. 142–155

Kaiser, T. R.: **Radio investigations of aurorae and related phenomena,** p. 156–173

Bagariatskii, B. A. and Fedorova, N. I.: **Spectra of the aurora and night-airglow in the infra-red region up to 11,800 Å,** p. 174–177

Omholt, A.: **Intensity measurements of the green auroral oxygen line and the negative nitrogen bands emitted from rapidly varying aurorae,** p. 178–182

Hunten, D. M.: **The interpretation of twilight measurements of sodium emission,** p. 183–192

Krasovskii, V. I.: **Infra-red night airglow as a manifestation of the process of oxygen recombination,** p. 193–196
Krasovskii, V. I.: **Ozone-hydrogen hypothesis of the hydroxyl night-airglow,** p. 197–200
Morozov, V. M. and Shklovskii, I. S.: **On the day airglow,** p. 201–203
Chapman, Sydney: **Note on persistent meteor trails.** p. 204–206
Chamberlain, Joseph W.: **Discharge theory of auroral rays,** p. 206–221
Lebedinskii, A. I.: **Electrical discharges and the interpretation of auroral types,** p. 222–224
Seaton, M. J.: **Excitation processes in the aurora and airglow, Pt. 3, Low-latitude aurorae,** p. 225–243
Percival, I. C. and Seaton, M. J.: **Excitation processes in the aurora and airglow, Pt. 4, On the excitation of permitted OI lines in high-latitude aurorae,** p. 244–248
Swings, P.: **Note on the relative intensities of the OI multiplets $3s^5S/-3p^5P$ and $3s^3S/-3p^3P$ in aurorae,** p. 249–250
Bates, D. R.: **Note on the processes governing emission by incident heavy particles,** p. 251–253
Petukhov, V. A.: **Solar neutron ejection as the cause of aurorae and magnetic storms,** p. 254–261
Gaydon, A. G.: **A laboratory source of the Herzberg bands of O_2,** p. 262–263
McKinley, J. D., Jr.; Garvin, David and Boudart, M. J.: **The reaction of atomic hydrogen with ozone,** p. 264–269
Tanaka, Yoshio and Ogawa, Masaru: **On the chemiluminescence of the sodium *D* lines in the reaction between ozone and sodium vapour,** p. 270–272
James, J. F.: **Laboratory experiments on the day airglow,** p. 273–275
Fan, C. Y.: **Laboratory studies of auroral excitation,** p. 276–282
Stewart, D. T.: **Electron excitation functions of N_2+ bands,** p. 282–286
Gribbon, P. W. F. and Stewart, D. T.: **The laboratory excitation of auroral infra-red OI lines,** p. 287–288
Seaton, M. J.: **The calculation of cross-sections for excitation of forbidden atomic lines by electron impact,** p. 289–301
Nicholls, R. W.: **Molecular band intensities and their interpretation,** p. 302–323
Garstang, R. H.: **Transition probabilities of auroral lines,** p. 324–327
Bates, D. R. and Dalgarno, A.: **Inelastic collisions between heavy particles,** p. 328–336
McCarroll, R. J. and Wakely, P. G.: **Transition probabilities for some lines of N II,** p. 337–339
Dalgarno, A. and McDowell, M. R. C.: **Simultaneous excitation and ionization of helium by electron and proton impact,** p. 340–345
Polanyi, J. C.: **A theoretical discussion of the conditions necessary for chemi-luminescence,** p. 346–350
Dufay, J.; Berthier, P.; Dufay, M. and Morignat, B.: **Méthode de mesure spéctrographique continue de l'intensité des raies brillantes du ciel nocturne,** [Method of continuous spectrographic measurement of the intensity of brilliant rays of the night sky], p. 351–354
Koomen, M. J.; Packer, D. M. and Tousey, R.: **The use of birefringent filters in measurements of the airglow,** p. 355–365
Armstrong, E. B.: **The observation of line profiles in the airglow and aurora with a photoelectric Fabry-Perot interferometer,** p. 366–373
Karandikar, R. B.: **Use of a recording Fabry-Perot interferometer for the measurement of λ5577 Å emission temperatures in the airglow and aurorae,** p. 374–387
Lebedinskii, A. E.: **A slitless spectrograph designed to photograph the spectra of aurorae,** p. 388–394
St. Amand, P.: **A new type of nightglow-auroral photometer,** p. 395–398
Nicodemus, F. E.; Edwards, H. D. and Ghosh, S. N.: **Experimental method for measuring the heights of luminescent layers in the atmosphere from a rocket by utilizing a biaxial pointing control,** p. 399–410

Akademiia Nauk SSSR, Izvestiia, Seriia Geofizich., No. 5, May 1956

Kolesnikov, A. G. and Pivovarov, A. A.: **O vozmozhnosti vychisleniia resul'tiruiushcheĭ teplovogo balansa na poverkhnosti vodokhranilishcha po temperature vozdukha,** [On the possibility of calculating the resultant of the thermal balance on the surface of reservoirs from air temperature], p. 534–540
Feĭgel'son, E. M. and Pastukhov, V. A.: **Uproshchennyĭ metod ucheta vytianutykh indikatris v zadachakh atmosfernoĭ optiki,** [A simplified method of calculating the attenuation indices in problems of atmospheric optics], p. 541–548
Vul'fson, N. I.: **Metod izucheniia konvektivnykh dvizheniĭ v svobodnoĭ atmosfere,** [Method of investigating convective movements in the free atmosphere], p. 549–561
Skatskiĭ, V. I.: **Elektromekhanicheskiĭ akselerograf s p'ezokvartsevym datchikom,** [Electromechanical accelerograph with a quartz piezoelectric transducer], p. 562–568

Shchelokov, V. V.: **Samoletnyĭ termometr,** [Airplane thermometer], p. 569–576
Tarkhov, A. G.: **Opredelenie elektricheskikh svoĭstv gornykh porod po zatukhaniiu radiovoln,** [The determination of the electrical properties of rocks from the attenuation of radio waves], p. 599–608
Minin, I. N.: **O svetovom rezhime v mutnoĭ srede,** [The light regime in a turbid medium], p. 617–619
Iudalevich, F. F.: **Soveshchanie po probleme mertsaniia zvezd,** [Meeting on the problem of star scintillation], p. 620–624

No. 6, June 1956

Sarkisian, A. S.: **Ob odnom obobshchenii teorii Ekmana,** [Simplification of Ekman's theory], p. 669–675
Malkevich, M. S.: **Metod teoreticheskogo opredeleniia vertikal'nogo gradienta temperatury vozdukha,** [Method for determining theoretically the vertical air temperature gradient], p. 676–688
Tatarskiĭ, V. I.: **Mikrostruktura temperaturnogo polia v prizemnom sloe atmosfery,** [Microstructure of the temperature field of the air layer near the ground], p. 689–699
Simonenko, T. N.: **O vychislenii znacheniĭ Za po izmerennym znacheniiam ΔT,** [Calculation of Z_a values according to measured ΔT values], p. 704–707
Ruzin, M. I.: **Vliianie turbulentnogo treniia na dvizhenie vozdushnykh chastits,** [Influence of turbulent friction on the movement of atmospheric particles], p. 722–727
Vul'fson, N. I. and Levin, L. M.: **Piataia mezhduvedomstvennaia konferentsiia po voprosam issledovaniia oblakov, osadkov i grozovogo elektrichestva,** [Fifth interdepartmental conference on cloud, precipitation and thunderstorm electricity research], p. 735–739
Solov'ev, V. A.: **A. I. Voeĭkov i sovremennye problemy klimatologii,** [A. I. Voeĭkov and modern problems of climatology], p. 739–743

No. 7, July 1956

Tareev, B. A.: **O nekotorykh prilozheniiakh metoda polnykh potokov k issledovaniiu kolebaniĭ urovnia melkogo moria,** [Some assumptions of the total flow method for the study of water level fluctuations of a shallow sea], p. 813–820
Vul'fson, N. I.: **Usloviia obrazovaniia kuchevykh oblakov v gornoĭ mestnosti,** [Conditions for the formation of cumulus clouds in mountainous areas], p. 821–830
Mkhitarian, A. M.: **O raspredelenii atmosfernogo davleniia na urovne moria,** [Distribution of atmospheric pressure at sea level], p. 831–834
Shashkin, V. L.: **Metod opredeleniia natural'nogo fona schetchikov gamma-izlucheniia,** [Method of determining the natural background level of gamma-radiation meters], p. 838–839
Krasnogorskaia, N. V.: **Rezul'taty izmereniia zariadov chastits osadkov v svobodnoĭ atmosfere,** [Results of measurements of charges on precipitation particles in the free atmosphere], p. 844–852
Litvinov, I. V.: **Opredelenie ustanovivsheĭsia skorosti padeniia chastits snegopadov,** [Determination of the terminal velocity of snowflakes], p. 853–856
Kachurin, L. G.; Zaĭtseva, N. A. and Lomanova, S. I.: **O temperaturnykh granitsakh obrazovaniia ledianykh chastits v peresyshchennom vodianom pare,** [Temperature limits for the formation of ice particles in a supersaturated atmosphere], p. 857–861
Iudalevich, F. F.: **O mnogokratnom rasseianii v infrakrasnoĭ oblasti spektra,** [Multiple scattering in the infrared region of the spectrum], p. 862–864
Morozov, V. M.: **K voprosu o proiskhozhdenii serebristykh oblakov,** [Origin of noctilucent clouds], p. 865–869
Khvostikov, I. A.: **O prirode serebristykh oblakov,** [Nature of noctilucent clouds], p. 869–871
Liubimova, E. A.: **Pervoe Vsesoiuznoe soveshchanie po geotermicheskim issledovaniiam v SSSR,** [The First All-Soviet Conference on Geothermic Investigation in the USSR], p. 874–876
Kirillov, F. A.: **Dissertatsii, zashchishchennye na uchenom sovete Geofizicheskogo instituta AN SSSR v 1956g,** [Dissertations defended before the Scientific Council of the Geophysical Institute of the Academy of Sciences of the USSR in 1956], p. 876–879

No. 8, Aug. 1956

Fel'zenbaum, A. I.: **Issledovanie sviazeĭ mezhdu vetrom, raspredeleniem plotnosti, urovnem i techeniiami neodnorodnogo moria,** [A study of the relationship between wind, density distribution, level and currents in a non-uniform sea], p. 958–967

Kagan, R. L. and Iudin, M. I.: **Priblizhennoe reshenie uravneniia rasseianiia sveta,** [An approximated solution of the equation of the scattering of light], p. 968–975

Megrelishvili, T. G.: **O granitsakh primenimosti sumerchnogo metoda issledovaniia atmosfery,** [On the limits of usefulness of the twilight method of studying the atmosphere], p. 976–983

Iaroslavtsev, I. N.: **Infrakrasnaia radiatsiia solntsa v spektral'nom intervale ot 0,8 do 3,5 $m\mu$,** [Infrared solar radiation in the spectral range from 0.8–3.5 $m\mu$], p. 984–990

Okhotsimskaia, M. V.: **Sezonnoe raspredelenie korotkoperiodicheskikh kolebaniĭ elektromagnitnogo polia zemli,** [Seasonal distribution of short-period fluctuations in the electromagnetic field of the earth], p. 999–1000

Slobadov, V. Ia., **K uchetu turbulentnogo obmena v zadache o raspredelenii davleniia i vetra v atmosfere,** [Calculating turbulent exchange in the problem of the distribution of pressure and wind in the atmosphere], p. 1001–1004

Kandidatskie dissertatsii, zashchishchennye na Uchenom sovete Geofizicheskogo Instituta AN SSSR v 1956g, [Masters' dissertations defended before the Scientific Council of the Geophysical Institute of the Academy of Science of the USSR in 1956], p. 1008

No. 9, Sept. 1956

Fedorov, K. N.: **O raschete polia plotnosti v okeane,** [Calculation of the density field in oceans], p. 1068–1079

Malkevich, M. S.: **O reshenii integral'nykh uravneniĭ teorii rasseianiia sveta v atmosfere,** [Solution of integral equations of the theory of light scattering in the atmosphere], p. 1080–1090

Diuviuk, A. F.: **O vertikal'nykh dvizheniiakh v oblastiakh dvizhushchikhsia frontov,** [Vertical movements in the region of moving fronts], p. 1091–1098

Deriabin, V. P.: **O vliianii prosykhaniia pochvy na ee teplovoĭ rezhim,** [The influence of soil desiccation on its thermal regime], p. 1099–1106

Imianitov, I. M.; Mikhaĭlovskaia, V. V.; Ziganov, N. P. and Strel'tsova, M. B.: **Pribor dlia dlitel'nykh izmereniĭ napriazhennosti elektricheskogo polia atmosfery v slozhnykh meteorologicheskikh usloviiakh,** [Instrument for long-term measurements of the intensity of the atmospheric electric field under complex meteorological conditions], p. 1121–1127

No. 10, Oct. 1956

Kamenkovich, V. M.: **O vliianii rel'efa dna na chisto dreĭfovoe techenie v odnorodnom bezbrezhnom more,** [The influence of bottom relief on a pure drift current in an infinite homogeneous sea], p. 1182–1187

Gutman, L. N. and Doroganevskaia, M. A.: **O raschete temperatury pochvy, pokrytoĭ snegom,** [Calculation of the temperature of the soil under snow], p. 1188–1199

Dergunov, I. D.: **O neobychnoĭ termicheskoĭ anomalii na poberezh'e Chernogo Moria,** [An unusual thermal anomaly on the shore of the Black Sea], p. 1219–1223

Smirnov, N. S.: **K voprosu o vliianii atomnogo vzryva na sostoianie atmosfery,** [The problem of the influence of an atomic explosion on the state of the atmosphere], p. 1127–1231

American Geophysical Union, Transactions, Vol. 37, No. 6, Dec. 1956

Stearn, Joseph L. and Parkin, Ernest J.: **A statistical analysis of Hiran measurements,** p. 665–668

Wollard, G. P.: **Standardization of the world's gravity data,** p. 669–675

Hess, Victor F. and Manning, A. W.: **A study of the ionization produced in various gases by cosmic radiation,** p. 676–678

Huff, F. A. and Neill, J. C.: **Frequency of point and areal mean rainfall rates,** p. 679–681

Van Dorn, W. G.: **Large-volume water samplers,** p. 682–684

Mandelbaum, Hugo: **Evidence for a critical wind velocity for air-sea boundary processes,** p. 685–690

Lawford, A. L. and Veley, V. F. C.: **Change in the relationship between wind and surface water movement at higher wind speeds,** p. 691–693

Silvester, Richard: **The use of cyclonicity charts in the study of littoral drift,** p. 694–696

Rona, Elizabeth; Gilpatrick, L. O. and Jeffrey, Lela M.: **Uranium determination in sea water,** p. 697–701

Hantush, Mahdi Salih: **Analysis of data from pumping tests in leaky aquifers,** p. 702–714

Cook, John C.: **Some observations in a Northwest Greenland crevasse,** p. 715–718

Nash, J. E.: **Frequency of discharges from ungaged catchments,** p. 719–725

Chappelear, J. E.: **An investigation of the solitary wave,** p. 726–734
Franzini, Joseph B.: **Permeameter wall effect,** p. 735–737
King, K. M.; Tanner, C. B. and Suomi, V. E.: **A floating lysimeter and its evaporation recorder,** p. 738–742
Singer, Irving A. and Brown, Robert M.: **The annual variations of sub-soil temperatures about a 600-foot circle,** p. 743–748
Woodburn, Russell and Kozachyn, John: **A study of relative erodibility of a group of Mississippi gully soils,** p. 749–753
Press, F. and Gutenberg, B.: **Channel *P* waves II_0 in the earth's crust,** p. 754–756
Gutenberg, B.: **Effects of ground on shaking in earthquakes,** p. 757–760
Callaghan, Eugene and Sun, Ming-Shan: **Correlation of some igneous rocks of New Mexico by the fusion method,** p. 761–766
Hubbard, Donald; Krumrine, Elizabeth M. and Stair, Ralph: **Australite (meteoric) glass** p. 767–778
Rodgers, John: **Trigonometric solution for determining the plunge of the intersection of two dipping planes,** p. 779–780
Rohwer, Carl; Cochrane, N. J. and Blaney, Harry F.: **Discussion of [Blaney's] Evaporation from and stabilization of Salton sea water surface,** p. 786–788

American Meteorological Society, Bulletin, Vol. 37, No. 10, Dec. 1956

Staats, Wayne F. and Turrentine, Charles M.: **Some observations and radar pictures of the Blackwell and Udall tornadoes of May 25, 1955,** p. 495–505
Robinson, Elmer and Bell, Gordon B., Jr.: **Low-level temperature structure under Alaskan ice fog conditions,** p. 506–513
Collins, George F.: **A severe weather service for industry,** p. 514–516
Dickson, Edwin B.: **Detection of developing tornadic activity,** p. 517–518
Bates, Charles C.: **Marine meteorology at the U. S. Navy Hydrographic Office: a resume of the past 125 years and the outlook for the future,** p. 519–527
Galway, Joseph G.: **The lifted index as a predictor of latent instability,** p. 528–529
Hartnett, William J.: **Weather Corporation of America: weathermen for industry,** p. 530–532
American Meteorological Society: **Program of its 150th National Meeting, Jan. 28–31, N. Y. (with abstracts of papers),** p. 533–544
Sargent, Frederick, II: **International Society of Bioclimatology and Biometeorology,** p. 551

Annalen der Meteorologie, Vol. 7, No. 7/9, 1955/56

Van der Bijl, Willem: **Statistische Bemerkungen zu H. Müller-Annen: "Versuche von Langfristvorhersagen mit einer Kontingenzmethode" nebst weiteren Betrachtungen über den prognostischen Wert von Kontingenztabellen,** [Statistical remarks on H. Müller-Annen: Attempts at long-range forecasts with a contingency method, and further remarks on the prognostic value of contingency tables], p. 289–302
Müller-Annen, Hans: **[Answer to preceeding article],** p. 303–309
Markgraf, Hans and Macht, Hans G.: **Zyklogenetische Gebiete auf dem nordatlantischen Ozean,** [Cyclogenetic regions on the North Atlantic Ocean], p. 310–321
Reidat, Rudolf: **Arbeitsblätter zur Ermittlung des Sonnenstandes und der Besonnungsdauer,** [Diagrams for determining the sun's altitude and azimuth and the possible duration of sunshine], p. 321–337
Walden, Hans: **Die Höhe der Windsee bei regionaler Zunahme der Windstärke in der Richtung mit dem Winde,** [Height of the wind-sea with general increasing wind force in the direction of the wind], p. 337–341
Effenberger, Ernst: **Die Anwendung moderner Methoden der mathematischen Statistik zur Bearbeitung von Messreihen über den Verunreinigungsgrad der Luft,** [The application of modern methods of mathematical statistics to series of measurements of air pollution], p. 342–352

Archiv für Meteorologie, Geophysik und Bioklimatologie, Serie A, Vol. 9, No. 4, 1956

Reuter, H.: **Über die Voraussage zeitlich gemittelter Höhenkarten für Zwecke mittelfristiger Wetterprognosen,** [Prediction of time-average upper-air charts for use in medium long range weather forecasting], p. 433–438
Kletter, L.: **Grenzen der Anwendbarkeit und Erweiterung der Trendmethode von Namias,** [Limits of application and extension of the Namias trend method], p. 439–445
Steinhauser, F.: **Die Temperaturänderungen in der freien Atmosphäre bei Niederschlägen,** [Temperature changes in the free atmosphere during precipitation], p. 446–467

Moore, J. G.: **The tropospheric temperature lapse rate,** p. 468–470
Huber-Pock, F.: **Untersuchungen über den Anteil bestimmter Atmosphärenschichten am Zustandekommen von Bodendruckänderungen,** [Research on the contribution of certain atmospheric layers to the occurrence of surface pressure changes], p. 471–486
Cehak, K.: **Über periodische and säkulare Schwankungen der Gewitterhäufigkeit auf der Erde,** [Periodic and secular variations of thunderstorm frequency on the globe], p. 487–513
Trapp, E.: **Beispiel einer einfachen Darstellung der Bebentätigkeit in einem engbegrenzten Gebiet,** [Example of a simple presentation of seismic activity in a closely limited region], p. 514–518
Mittmann, O. M. J.: **Varianz-Untersuchungen bei stationären Variablen,** [Variance analysis with stationary variables], p. 519–523
Mörikofer, W.: [**Obituary of**] **Gustav Swoboda,** p. 524–526
Buchbesprechungen, [Reviews], p. 527–532

Australian Journal of Physics, Melbourne, Vol. 9, No. 3, Sept. 1956

Bracewell, R. N.: **Two-dimensional aerial smoothing in radio astronomy,** p. 297–314
Wild, J. P. and Zirin, H.: **On the association of solar radio emission and solar prominences,** p. 315–323
Gregory, J. B.: **Ionospheric reflection from heights below the E region,** p. 324–342
Munro, G. H. and Heisler, L. H.: **Divergence of radio rays in the ionosphere,** p. 359–372
Ball, F. K.: **The theory of strong katabatic winds,** p. 373–386
Das, S. C.: **Statistical analysis of Australian pressure data,** p. 394–399

Australian Meteorological Magazine, Melbourne, No. 13, June 1956

Foley, J. C.: **500 mb. contour patterns associated with the occurrence of widespread rains in Australia,** p. 1–18
Phillips, E. F.: **Warm tongue steering of tropical cyclones,** p. 19–30
Newman, B. W. and Ruckert, P. J. H.: **Severe hail storm, Brisbane, Queensland,** p. 31–39
Hannay, A. K.: **Use of Showalter's stability index in thunderstorm forecasting,** p. 40–45
Dunstan, R. R.: **Tornado, North Richmond, Feb. 20, 1956,** p. 46–49

Batchelor, G. K. and Davies, R. M., (eds.), **Surveys in mechanics: a collection of surveys of the present position of research in some branches of mechanics, written in commemoration of the 70th birthday of Geoffrey Ingram Taylor.** Cambridge, Eng., Univ. Press, 1956.

Lane, W. R. and Green, H. L.: **The mechanics of drops and bubbles,** p. 162–215
Ursell, F.: **Wave generation by wind,** p. 215–249
Lighthill, M. J.: **Viscosity effects in sound waves of finite amplitude,** p. 250–351
Batchelor, G. K. and Townsend, A. A.: **Turbulent diffusion,** p. 352–399
Ellison, T. H.: **Atmospheric turbulence,** p. 400–430
Davidson, K. S. M.: **The mechanics of sailing ships and yachts,** p. 431–475

Geofisica e Meteorologia, Genoa, Vol. 4, No. 4/5, July/Oct. 1956

Contini, Camillo: **La prospezione termometrica del vapore naturale,** [Thermal prospecting of natural vapors], p. 61–95
Bossolasco, M. and Dagnino, I.: **Caratteristiche fisico-meteorologiche del manto nevoso,** [Physico-meteorological characteristics of snow cover], p. 96–102
Piccardi, G. and Becker, U.: **Test chimico ed attività solare,** [Chemical test of solar activity], p. 103–104

Időjárás, Budapest, Vol. 60, No. 3, May/June 1956

Dési, Frigyes: **A meteorológiai ismeretek hiányának káros hatása mezőgazdasági termelésünkben,** [Undesirable consequences in crop production due to lack of meteorological knowledge], p. 129–136
Béll, Béla: **Marczell György aerológiai munkássága,** [György Marczell's achievements in the field of aerology], p. 137–143
Bartels, G.: **A kozmikus sugárzás szoláris napi járásának fázisváltozásai,** [Phase shifts in the solar diurnal variation of cosmic radiation], p. 144–149
Bodolai, István and Bodolai, Emma (Jakus): **Megjegyzések az abszolút topográfiák számszerű előrejelzéséhez,** [Some remarks on the numerical forecasting of lines of absolute topography], p. 150–158

Kozma, Ferenc: **A harmatpont és a helyi fagyelőrejelzések,** [Dewpoint and local frost forecasting], p. 159–167

Ádám, Tamás and Batta, Erzsébet: **Az időjárás hatása a tejtermelésre,** [Weather effects on milk production], p. 168–176

Béll, Béla: **A zivatarhajlam szinoptikus vizsgálata,** [Synoptic investigation of thunderstorm tendency], p. 177–178

Péczely, György: **A −10 C° alatti napi középhőmérsékletek szekuláris menetéről,** [Secular variations of daily mean temperature below −10°C], p. 178–180

Dvorcsák, István: **A nedvesség advektív változásának meghatározásáról,** [Determination of advective changes in humidity], p. 181–182

Berkes, Zoltán: **Jelentős ultrapoláris folyamatok,** [Significant ultrapolar processes], p. 183–184

Szakály, József: **A harmat méréséről,** [On the measurement of dew], p. 184–185

Péczely, György: **Gyakorisági eloszlások fölbontásának alkalmazása a meteorológiában,** [Meteorological applications of the analysis of frequency distributions], p. 186

Vol. 60, No. 4, July/Aug. 1956

Dési, Frigyes: **A magyar meteorológiai kutatás időszerű feladatai,** [Current problems of meteorological research in Hungary], p. 201–206

Ulanova, E.: **Az őszi gabonafélék fenológiai fázisainak kiszámítása az őszi időszakban,** [Calculation of the phenological phases of winter grain during the fall season], p. 206–211

Klinker, L.: **Meteorológiai befolyások a rövid periódusú elhalkulások kialakulására az ultrarövid hullámú távolsági forgalomban,** [Meteorological influences on the production of fadings of short duration in VHF long-distance communication], p. 212–221

Kallós, Imre: **Pszichrométer nomogramm,** [A psychrometric nomogram], p. 221–226

Kérdő, István: **A bioklimatológia alapfogalmai,** [Basic concepts of bioclimatology], p. 227–235

Kiss, István: **A szinoptika felhasználása a biológiai kutatásokban,** [The use of synoptic meteorology in biological research], p. 236–240

Bellán, Gyula: **A sertések ún. tüdővizenyőjének meteorológiai vonatkozásai,** [Meteorological connection of oedema of the lungs in hogs], p. 241–247

Réthly, Antal: **Conrad professzor 80 éves,** [Professor Conrad, octogenarian], p. 248–249

Berényi, Dénes: **A búza "kombájnérettsége" és az időjárás,** [The "combine ripeness" of wheat and the weather], p. 250–252

Ravasz, Tibor: **Néhány szó a meteorológia és az agronómusok kérdéséről,** [Comments on the problem of meteorology and agronomists], p. 253–254

Ambrózy, Pál: **A természetes szinoptikus periódusokról,** [The natural synoptic periods], p. 254–256

Berkes, Zoltán: **A meteorobiológiai kutatás kérdései,** [Problems of meteorobiological research], p. 257–258

Indian Journal of Meteorology and Geophysics, Delhi, Vol. 7, No. 4, Oct. 1956

Das, A. K.: **Report of the Indian expedition to Ceylon to observe the total solar eclipse of June 20, 1955,** p. 323–332

Pisharoty, P. R. and Desai, B. N.: **"Western disturbances" and Indian weather,** p. 333–338

Koteswaram, P. and Gaspar, S.: **The surface structure of tropical cyclones in the Indian area,** p. 339–352

Saha, K. R.: **The application of the theory of tethered balloons to measurement of low level winds,** p. 353–362

Hariharan, P. S.: **A study of the extension of cold waves at the surface in relation to upper winds at 3000 ft in India,** p. 363–370

Natarajan, K. K.: **A note on the hot days of Bombay, 1878–1955,** p. 371–376

Poornachandra Rao, C.: **Ocean currents off Visakhapatnam,** p. 377–379

Thiruvengadathan, A.: **The magnetic disturbance field at Kodaikanal,** p. 380–384

Balasubramanian, C. and Bakthavathsalu, C. M.: **A preliminary study on frost formation at Nanjanad: Nilgris District,** p. 404–405

Sinha, K. L.: **Abnormally strong gusty winds in West Rajasthan on March 15, 1956,** p. 405–406

Japan. Central Meteorological Observatory, Tokyo, Memoirs of Industrial Meteorology, Vol. 19, No. 2, March 1956

Yamanaka, K.: **Estimation of the frost damage on crops,** p. 77–80

Kakehashi, I. and Nakanishi, K.: **About the summer drought and the climatic variation in Mie Prefecture,** p. 81–89

Fukushima, Japan. Weather Station: **On the nocturnal temperature variation surrounding the orchards on a frosty night, Pt. 2,** p. 91–99
Kubo, J.: **Construction planning and air temperature,** p. 101–104
Daigo, Y.; Maruyama, E. and Suzuki, Y.: **Studies on the freezing damage on water pipe,** p. 105–116
Fukuoka District, Japan. Central Meteorological Observatory: **Meteorological study on the large-scale generation of electricity by wind power,** p. 117–147

Japan. Science Council. Ionosphere Research Committee, Report of Ionosphere Research in Japan, Vol. 10, No. 1, 1956

Miya, Ken-chi and Kanaya, Sumio: **On the lateral deviation of radio waves coming from Europe,** p. 1–8
Maeda, Kaichi: **Atmospheric latitude effect on cosmic radiation,** p. 9–14
Ota, Masaziro: **An example of the distorted geomagnetic field during the solar eclipse of June 20, 1955,** p. 15–16
Maeda, Hiroshi: **Correction to [his] paper: Observed facts of the geomagnetic distortion in the ionosphere,** p. 17

Journal of Atmospheric and Terrestrial Physics, London, Vol. 9, No. 5/6, Nov. 1956

Groves, G. V.: **Effect of experimental errors on determinations of wind velocity, speed of sound, and atmospheric pressure, in the rocket-grenade experiment,** p. 237–261
Donahue, T. M.: **The Rayleigh scattering correction in measurements of the sodium twilight flash,** p. 262–268
Whitehead, J. D.: **The focusing of short radio waves reflected from the ionosphere,** p. 269–275
Whitehead, J. D.: **The absorption of radio waves in an ionospheric layer,** p. 276–281
Drummond, J. E.: **The connection between ionospheric patterns and field strengths reflected on the ground,** p. 282–294
Nolan, P. J.: **The equilibrium of ionization in the atmosphere and nuclear combination coefficients,** p. 295–303
Dungey, J. W.: **Convective diffusion in the equatorial F region,** p. 304–310
Chalmers, J. Alan: **The vertical electric current during continuous rain and snow,** p. 311 321
Mullaly, R. F.: **The calculation of group velocity in magneto-ionic theory,** p. 322–325
Gribbon, P. W. F.: **Notes on the spectra of oxygen,** p. 326–328
Ligda, Myron G. H.: **The radar observation of lightning,** p. 329–346
Laffineur, M. and Whitehead, J. D.: **The measurement of cosmic radio emission for ionospheric studies,** p. 347–349
Groves, G. V.: **A rigorous method of analysing data of the rocket-grenade experiment,** p. 349–351
Kato, Yoshio and Akasofu, Syun-ichi: **Relationships between geomagnetic micropulsation and the solar *UM* region,** p. 352–354

Journal of Meteorological Research, Tokyo, Vol. 8, No. 6, July 1956

Saito, R.: **On the homogeneity of observed values of vapor pressure and relative humidity,** p. 327—334
Okamura, Y.: **Barotropic forecasting of a typhoon by means of gradient flow pattern,** p. 335–342
Saito, N.: **On the analysis of cold wave in Jan. 1954 and the technique of forecasting of cold air outbreak,** p. 343–353
Tabata, S.: **Statistical study of topographical effects on the wind speed and direction,** p. 354 359
Nakayama, I.: **On the variations of water temperature in the Sea of Japan,** p. 360–364
Kamamoto, H.: **Study of cycloid gears for time keeper,** p. 365–375
Tsuruga, Japan. Weather Station: **Underground water in Tsuruga Fan area,** p. 376–382
Nagao, T.: **Cyclone series and action front (Characters of weather group and its application to long-range weather forecasting, Pt. 11),** p. 383–387
Seki, S.: **On the tide of Kagoshima Harbour,** p. 388–390
Tanioka, K. and Ogawa, M.: **Harmonic constants of tides at Tonoura and Sakai,** p. 391–393

Vol. 8, No. 7, Aug. 1956

Ito, S.: **Dynamical study on the development of trough (Studies on the divergence analysis, Pt. 2),** p. 395–407
Masatsuka, A. and Machii, K.: **On the return period of the continuance of rainless days in Japan,** p. 400–408

Yamada, N.: **Visibility at the Tokyo International Air-Port,** p. 409–421
Nakayama, I.: **On the influence of the river water on the oceanographical condition in the western part of Wakasa Bay,** p. 422–424
Hayashi, E.; Sekiguchi, Y. and Yada, A.: **On the solar radiation error of Japanese radiosonde and its correction,** p. 425–437
Kurashima, A.: **Investigation on the broad scale weather types, Pt. 1,** p. 438–442
Mori, S.: **Forecasting of icing condition,** p. 443–449
Watanabe, T.: **On the entropy of anomaly types of five-day mean 700-mb height on the Far East,** p. 450–451
Kasamura, Y.: **Some characters of heavy rainfall in Kyushu District,** p. 452–458
Yajima, Y.: **On the response of meteorological instruments,** p. 459–462

Vol. 8, No. 8, Oct. 1956

Suda, K.: **On the unusual hot summer of 1955,** p. 463–472
Gambo, K.; Saito, N.; Fujiwara, S. and Murakami, T.: **Topographical effects upon the numerical weather prediction in the lower atmosphere,** p. 472–494
Ozawa, T. and Tomatsu, K.: **On the mechanism of warm and cold weather in summer in the neighbourhood of Japan,** p. 495–502
Kobayashi, S.: **On the asymmetry of circumpolar currents,** p. 503–507
Nagao, T.: **Characters of weather group and its application to long-range weather forecasting, Pt. 12,** p. 508–515
Ogata, T.; Kanazawa, M. and Yoshida, F.: **On the particular weather phenomenon between warm and cold sea currents, Pt. 1,** p. 516–522
Suzuki, K.: **An experiment in numerical forecasting with the barotropic model,** p. 523–527
Yahagi, M.: **On the relation between winds and waves in the Lake Kasumigaura,** p. 528–531
Takahashi, N.: **Influence of relative humidity on roll paper,** p. 532–536

Vol. 8, No. 9, Oct. 1956

Watanabe, T.: **Relations between the normal fields of divergence or convergence of the integrated atmosphere and the normal fields of heat or cold source,** p. 537–540
Ando, M.: **General circulation observed from the variations of the mass of air over the Northern Hemisphere, Pt. 2,** p. 541–551
Suzuki, E.: **On the several statistical theories of gamma-distribution and their applications to the problems of rainfall data (Statistical study on the amount of precipitation, Pt. 5),** p. 552–559
Yamashita, H. and Kasugai, T.: **Forecast of the precipitation in Fukushima Prefecture by the so-called Nankai-low, Pt. 1,** p. 560–567
Yoshihara, Z.: **The accuracy of radar observations of rainfall,** p. 568–573
Yamada, S.; Ōtsubo, S. and Danjō, T.: **A study on quantitative forecasting of precipitation amount in Kyushu District, Pt. 3,** p. 574–580
Imayama, M.: **Relationship between the hourly rainfall and the total rainfall in the Chikugo River drainage,** p. 581–584
Narita, G.: **Local heavy rainfall in Soya District,** p. 585–592
Nagao, T.: **Characters of weather group and its application to long-range weather forecasting, Pt. 13,** p. 593–599
Kamiko, T.: **On the analysis of index cycle and application of angular momentum transport theory to the prediction of zonal index,** p. 600–604
Tanemura, I.; Takeichi, K. and Osaki, Y.: **Method for humidity measurement by wet- and dry-bulb psychrometer below 0°C,** p. 605–606
Kambe, M.: **On the recording clock regulator,** p. 607–608
Tomioka, S.: **On the work sheet of rainfall forecasting,** p. 609–611

Vol. 8, No. 10, Nov. 1956

Saito, R.: **On the homogeneity of records of phenomena,** p. 613–622
Akai, S.: **A meteorological study on heating and the forecasting of room-temperature,** p. 622–626
Akiyama, T.: **On the occurrence of the local severe wind "Yamaji," Pt. 2,** p. 627–639
Kodama, R.: **On the orographic rain on the slope of Mt. Ibuki, Pt. 2,** p. 642–648
Tazawa, K.: **On the eruption of Volcano Mihara and volcanic earthquakes in Izu Ōshima Island, Pt. 1,** p. 649–653

Kato, Y.; Yoshida, E. and Kato, K.: **On the local wind at Miyako,** p. 654–659
Nagao, T.: **Characters of weather group and its application to long-range weather forecasting, Pt. 14,** p. 660–666
Seki, S.: **On the tide of Hachinohe Harbour,** p. 667–669

Journal of Meteorology, Boston, Vol. 13, No. 6, Dec. 1956

Landers, Holbrook: **Vorticity distribution and advection in the lower and middle troposphere,** p. 511–520
Kuo, H.-L.: **Forced and free axially-symmetric convection produced by differential heating in a rotating fluid,** p. 521–527
Newton, C. W.: **Mechanisms of circulation change during a lee cyclogenesis,** p. 528–539
Crider, Walter L.; Milburn, Richard H. and Morton, Stephen D.: **The evaporation and rehydration of aqueous solutions,** p. 540–547
Eber, Laurence E. and Seely, Ben K.: **A chemical tracer experiment in orographic clouds,** p. 548–553
Langleben, M. P.: **The plan pattern of snow echoes at the generating level,** p. 554-560
Kuo, H.-L.: **Forced and free meridional circulations in the atmosphere,** p. 561–568
Bundgaard, Robert C.: **Computation of streamlines from the pressure field,** p. 569–582
Karplus, Walter J. and Allder, James R.: **Atmospheric turbulent diffusion from infinite line sources: An electric analog solution,** p. 583–586
Battan, Louis J. and Braham, Roscoe R., Jr.: **A study of convective precipitation based on cloud and radar observations,** p. 587–591
Schell, Irving I.: **On the nature and origin of the southern oscillation,** p. 592–598
Arakawa, H.: **Climatic change as revealed by the blooming dates of the cherry blossoms at Kyoto,** p. 599–600
Van Mieghem, J.: **[Comments on A. K. Blackadar]: Extension of the laws of thermodynamics to turbulent systems,** p. 600–601
Blackadar, A. K.: **Reply [to preceding article],** p. 601
aufm Kampe, H. J.: **Upper-air wind measurements with small rockets,** p. 601–602

Journal Scientifique de la Météorologie, Paris, Vol. 7, No. 26, April/June 1955

Bayardelle, M. and Roulleau, J.: **Sur l'entretien des anticyclones océaniques,** [On the maintenance of oceanic anticyclones], p. 214–220
Seneca, J.: **Mesures de diffusivité turbulente sur des flocons de fumée,** [Measurement of turbulent diffusion by means of smoke puffs], p. 221–225
Saïssac, J.: **Sur la diffusion turbulente homogène des particules,** [Homogeneous turbulent diffusion of particles], p. 227–232
Borrel, F.: **Sur une méthode polarographique de dosage de l'ion Cl^- dans les eaux météoriques,** [A polarographic method of Cl^- ion sampling in rainwater], p. 233–239
Dady, G.: **Remarques sur les essais de prévision numérique par la méthode "temp,"** [Comments on numerical forecasting experiments by the "temp" method], p. 241–247
Elnesr, M. K.: **Profils de l'humidité et de la température au-dessus du gazon court,** [Humidity and temperature profiles over short grass], p. 249–253

Vol. 7, No. 27, July/Sept. 1955

Petit, M.: **Un barographe logarithmique,** [A logarithmic barograph], p. 255–258
Kiveliovitch, M. and Vialar, J.: **Quelques nouveaux tests pour l'étude des séries chronologiques, Pt. 3,** [Some new tests for the study of chronological series, Pt. 3], p. 259–271
Giao, A.: **Le facteur de non-analyticité du champ de pression et la prévision numérique,** [Non-analytical factor of the pressure field and numerical forecasting], p. 273–287
Elnesr, M. K.: **Variation verticale de l'indice de réfraction de l'air,** [Vertical variation of the atmospheric refractive index], p. 289–293
Weiller, A. R.: **Réflexions sur les tests du hasard de MM. Kivéliovitch et Vialar,** [Comments on the chance tests of Kivéliovitch and Vialar], p. 295–299

The Marine Observer, London, Vol. 27, No. 175, Jan. 1957

Marine Observer's Log—January, February, March, p. 4
Old Time Marine Observer's Log, p. 18
Sutton, O. G.: **The Meteorological Office and the International Geophysical Year,** p. 19
Shellard, H. C.: **The International Geophysical Year,** p. 20

Fuchs, V. E.: **Voyage of Trans-Antarctic Expedition's Advance Party to the Antarctic,** p. 27
Limbert, D. W. S.: **Voyage of Royal Society's Advance Party to the Antarctic,** p. 28
Wordie, J. M.: **Ice in the Weddell Sea,** p. 31
Deacon, G. E. R.: **Oceanography in the International Geophysical Year,** p. 33
Aurora Observations during the International Geophysical Year, p. 36
Williams, C. H.: **Sail Training-Ship International race,** p. 38
Presentation of barographs, p. 39
Radar propagation reports, p. 40
Short-wave radio fade-outs, p. 41

Meteorological Society of Japan, Tokyo, Journal, Ser. 2, Vol. 34, No. 4, Aug. 1956

Isono, K.; Fujita, H. and Komabayasi, M.: **Change in droplets spectrum and water content of a cloud induced by salt water seeding,** p. 177–184
Sano, I.; Fujitani, Y.; Ito, K. and Kitani, S.: **A field experiment of snow-making by seeding with nickel oxide,** p. 185–189
Katow, K.: **Analysis of tropospheric structure during the Baiu season in 1954,** p. 190–201
Orihata, J.: **On the development of low latitude extra-tropical cyclones in the East China Sea,** p. 202–211
Miyakoda, K.: **Forecasting formula of precipitation and the problem of conveyance of water vapour,** p. 212–225
Miyake, Y.; Sugiura, Y. and Katsuragi, Y.: **Radioactive fallout at Asahikawa, Hokkaido in April 1955,** p. 226–230
Kawamura, K.: **Results of the observation of atmospheric ozone at Tokyo,** p. 231–234

Vol. 34, No. 5, Oct. 1956

Hatakeyama, Hisanao: **Obituary notice of Dr. Takematsu Okada, Honorary Member,** p. i–ii
Yamamoto, Ryozaburo: **Theory of the microbarographic waves (I), (Study of the microbarographic waves (I), Pt. 1),** p. 235–243
Mohri, K.: **An aerological study of heavy rainfall over West and Central Japan during early summer 1953,** p. 244–253
Gambo, K.; Saito, N.; Fujiwara, S. and Murakami, T.: **Topographical effects on the numerical weather prediction in the lower atmosphere,** p. 254–265
Saito, N.: **On the calculation of the vertical p-velocity concerning the wet adiabatic process,** p. 266–270
Fujiwara, S.: **The precipitation under the assumption of dry adiabatic change and moist adiabatic change of the air,** p. 271–275
Sekioka, M.: **Synoptic structure of typhoon Marie passing over the Japan Sea (A hypothesis on complex of tropical and extratropical cyclones for typhoon in the middle latitudes, Pt. 1),** p. 276–287
Matano, H.: **A note on the vertical structure of typhoon,** p. 288–292
Sano, I. and Fukuta, N.: **Observations of the ice-nucleating temperature of some chemical substances,** p. 293–295

Meteorologické Zprávy, Prague, Vol. 7, No. 2, 1954

Urbánek, Bedřich: **Průběh metamorfosy, diagenese a teploty ve sněhové pokrývce, Pt. 1,** [Metamorphic, diagenetic and thermal changes in a snow cover, Pt. 1], p. 29–35
Mesároš, J.: **Pestovanie ryže na Slovensku a vplyv počasia na jej vzrast,** [Effect of weather on rice crops in Slovakia], p. 36–37
Brandejs, Stanislav; Kopáček, Jaroslav; Vítek, Vojtěch and Zikmunda, Otakar: **Prognosa přestavby synoptické situace,** [Forecasting the regeneration of the synoptic situation], p. 37–46
Gregor, A.: **Možnost vzniku pleistocenního zalednění v době převládající meridionální cirkulace troposféry,** [Possibility of pleistocene glaciation coincident with a prevailing meridional tropospheric circulation], p. 46–47
Rein, František: **Poznámky k přibývání srážek s rostoucí nadmořskou výškou, I. Aplikace grafické korelační methody podle Prof. Šalamona,** [Increase of precipitation with increasing altitude, Pt. 1, Application of the graphic correlation method of Prof. Salamon], p. 48–51
Kazanský, B.: **Vliv povětrnostních poměrů na televisní příjem,** [Influence of weather conditions on television reception], p. 53–55

Rutkovskij, V. I.: **Šířeji rozvinout výzkumy z lesnického vodního hospodářství a lesnické meteorologie,** [For a more extensive development of research in forest water economy and forest meteorology], p. 51–52

Vol. 9, No. 3, 1956

Petrovič, Š. and Vesecký, A.: **Konferencia Europskej regionálnej asociácie SMO v Dubrovníku v dňoch 12. až 24. marca 1956,** [Conference of the European Regional Association of the WMO at Dubrovnik, March 12–24, 1956], p. 65–66

Rosík, Bohumil: **Zpracováni dešťových křivek periodicity v SSSR a v Německu,** [Plotting precipitation periodicity curves in the USSR and Germany], p. 67–69

Quitt, Evžen: **Příspěvek k metodice výzkumu teplotních poměrů měst,** [On methods of studying temperatures in cities], p. 69–74

Rein, František: **Oblačnost na Milešovce v letech 1946–1955,** [Cloudiness over Milesovka, 1946–1955], p. 74–77

Veselá, Dagmar and Vítek, Vojtěch: **Příspěvek k fysikálné interpretaci Eliassenova modelu,** [A contribution to the physical interpretation of Eliassen's model], p. 78–81

Picko, Václav: **Pokus o klasifikaci teplotních poměrů krajových,** [Suggested classification of regional temperature conditions], p. 81–84

Vol. 9, No. 4, 1956

Gregor, A.: **Za Dr. Gustavem Swobodou,** [In memoriam, Gustav Swoboda], p. 85

Rein, František: **Teplota na Milešovce v letech 1946–1955,** [Temperature at Milesovka during 1946–1955], p. 86–90

Danč, Ján: **Nomogramy pre nový zákalový činitel' Linkeho,** [Nomograms for the new Linke turbidity factor], p. 90–97

Bayer, Karel: **Pravidelná ochlazení na konci Května a v Červnu v období 1906–1955,** [Consistent cooling at the end of May and in June during the period 1906–1955], p. 97–105

Vítek, Vojtěch: **Mechanismus výškových změn hladiny nondivergence,** [Mechanism of height variations of the surface of nondivergence], p. 105–108

Kopecký, Miloslav: **Periodicita a předpovědi výskytu slunečních škvrn,** [Periodicity and prediction of sunspot occurrence], p. 108–112

La Météorologie, Paris, No. 42, April/June 1956

Dollfus, M.: **Les conditions météorologiques sur la planète Mars,** [Meteorological conditions on the planet Mars], p. 81–91

Escher-Desrivières, J. and Grisollet, H.: **Contribution à l'étude de l'insolation des constructions habitées, au cours de l'hiver, dans la région Parisienne,** [On the insolation of dwellings in winter in the Paris area], p. 93–104

Fontaine, P.: **Analyse succincte des conditions météorologiques qui ont été à l'origine de la crue de la Seine en Janvier 1955,** [Brief analysis of the meteorological conditions responsible for the Seine flood of Jan. 1955], p. 105–115

Sanson, J.: **Evocation antique de météorologie religieuse,** [Religious meteorology of antiquity], p. 117–120

Chaussard, A.: **Les orages du 27 août 1955 sur le Lyonnais,** [Thunderstorms on Aug. 27, 1955 in the Lyons region], p. 121–126

Bourgeois, J.: **Les oscillations de la température et la notion de la température moyenne,** [Temperature variations and the concept of mean temperature], p. 127 131

La contribution des services du S.M.M.A. a l'indemnisation du chomage-intempéries des travailleurs du batiment et des travaux publics, [Contribution of the services of the S.M.M.A. to bad-weather unemployment compensation for workers of the construction industry and of public works], p. 133–134

Sanson, J.: **En marge météorologique de la petite histoire,** [Meteorological notes from local history], p. 135–143

No. 43, July/Sept. 1956

Arléry, R.: **À propos des froids exceptionnels de février 1956 en France,** [Exceptional cold in February 1956 in France], p. 159–170

Gabilly, A.: **Prévision météorologique à longue échéance,** [Long range weather forecasting], p. 171–189

Mironovitch, Valéry: **Prévision du champ barométrique moyen en quinze et trente jours,** [Fifteen and 30-day forecasting of the mean barometric field], p. 191–214

Perrin de Brichambaut, C.: **Notes sur les pluies en A.E.F.,** [Notes on precipitation in French Equatorial Africa], p. 215–241

Tschirhart, G.: **Étude de l'évolution particulière d'une masse d'air,** [Study of an unusual evolution of an air mass], p. 243–258

Mouton, J.: **Étude climatologique sur la Vallée du Niari, Moyen-Congo,** [Climatological study of the Niari Valley, Middle Congo], p. 259–265

Heynard, F.: **Contribution à l'étude du climat Bordelais,** [Contribution to the study of the climate of Bordeaux], p. 267–278

Duclaux, Françoise: **Étude statistique des témperatures de l'air à Clermont-Ferrand,** [Statistical study of air temperatures at Clermont-Ferrand], p. 279–284

Ward, Nicolas: **Les pluies torrentielles du Nord-Liban du 17 Décembre 1955,** [Torrential rains of North Lebanon, Dec. 17, 1955], p. 285–288

Masson, H. and Salvador, O.: **Sur les phénomènes électriques qui accompagnent le gonflement d'un ballon sonde,** [Electric phenomena which accompany the inflation of a sounding balloon], p. 289–293

Sanson, J.: **Le climat de Paris au début de l'époque romantique était a peu près identique a celui du milieu du XX^{e} siecle,** [Paris climate at the beginning of the Romantic Period was nearly identical to that of the mid 20th century], p. 293–299

Meteorologische Rundschau, Berlin, Vol. 9, No. 11/12, Nov./Dec. 1956

Weickmann, L.: [**Obituary of**] **Dr. Gustav Swoboda,** p. 193–194

Hollmann, G.: **Zur Bedeutung der Tendenzgleichung für die Interpretation synoptischer Luftdruckänderungen,** [Importance of the tendency equation for the interpretation of synoptic pressure changes], p. 194–197

Essenwanger, Oskar: **Zur Verwendung eines logarithmischen Maszstabes bei der Niederschlagsstatistik,** [Application of a logarithmic scale in precipitation statistics], p. 197–206

Maier, Wilhelm: **Sonnendoppelschatten und Purpurlicht,** [Double sun shadows and purple light], p. 206–210

Rau, Walter: **Bestimmung der Grösse und Häufigkeit der Chloridteilchen im maritimen Aerosol,** [Determination of the size and frequency of chloride particles in maritime aerosol], p. 210–214

Neuwirth, R.: **Luft- und niederschlagschemische Untersuchungen in Südschwarzwald,** [Investigations of chemistry of air and precipitation in the southern Black Forest], p. 215–218

Winter, Fritz: **Erfahrungen bei Messfahrten zur Beurteilung der Kaltluftgefahr,** [Experiences on journeys to investigate cause of cold air danger], p. 219–221

Portig, Wilfried: **Tropengewitter,** [Tropical thunder], p. 221–223

Schlegel, Max: **Weitere Beobachtungen von Druckwellen bei Wasserstoffbomben-explosionen im Frühjahr 1954,** [Further observations of pressure waves from hydrogen bomb explosions in spring 1954], p. 223–224

Winter, Fritz: **Schornsteinrauch veranschaulicht das abendliche Einsetzen des Hangabwindes,** [Chimney smoke shows onset of the katabatic wind in the evening], p. 224

Monthly Weather Review, Wash., D. C., Vol. 84, No. 10, Oct. 1956

Dean, Gordon A.: **1955 mean monthly wind summary along reconnaissance track northwest of the Hawaiian Islands at 500 mb,** p. 353–362

Hawkins, Harry F., Jr.: **The weather and circulation of Oct. 1956, including a discussion of the relationship of mean 700-mb height anomalies to sea level flow,** p. 363–370

Vore, C. W. and McCarter, R. M.: **Prognostic problems associated with cutoff Nevada lows, as illustrated by the case of Oct. 23–24, 1956,** p. 371–376

Vol. 84, No. 11, Nov. 1956

Rosenthal, Stanley L. and Baum, Werner A.: **Diurnal variation of surface pressure over the North Atlantic Ocean,** p. 379

Hosler, C. L. and Gamage, L. A.: **Cyclone frequencies in the United States for the period 1905 to 1954,** p. 388

Dunn, Carlos R.: **The weather and circulation of November 1956: another October to November circulation reversal,** p. 391

Jacobson, Henry L.; Sanders, Robert A. and Hanson, Donald M.: **The central high plains storm of November 1–3, 1956,** p. 401

Jordan, Harold M. and Clark, John R.: **Analysis of frontal boundaries by means of thickness anomalies, November 12–16, 1956,** p. 415

Oceanography and Meteorology, Nagasaki, Japan, Vol. 7, Nos. 1–4, June 1956

Nagai, M.: **A note on the water mass separation.** (Paper No. 1)
Nagai, Masao: **A note on the annual variation of dissolved oxygen in sea water, Pt. 1.** (Paper No. 2)
Nagai, Masao: **A note on the annual variation of dissolved oxygen in sea water, Pt. 2.** (Paper No. 3)
Ishiguro, Shizuwo and Fujiki, Akimitsu: **An analytical method for the oscillations of water in a bay or lake, using an electric network and an electronic analogue computer.** (Paper No. 4)
Nagayama, M.: **Some considerations on the heavy rainfall over Kyushu District in the Third Decade of June 1953.** (Paper No. 5)
Ishiguro, Shizuwo: **An electronic recorder for sea wave pressure, type 3.** (Paper No. 6)
Ishiguro, Shizuwo: Fujiki, Akimitsu and Nagata, Mitsukazu: **An electronic measuring apparatus for sea wave pressure, Type 6.** (Paper No. 7)
Ishiguro, S.; Fujiki, A. and Nagata, M.: **A method of systematic design for Tucker's type transducer.** (Paper No. 8)
Oosawa, K.: **The gustwindstorm project in the western seas of Kyushu, Japan, carried out from Jan. 21 to Feb. 20, 1955.** (Paper No. 9)
Terada, Kazuhiko: **Development of typhoon from the viewpoint of energy supply from ocean.** (Paper No. 10)

Physical Society of London, Proceedings, Sec. B, Vol. 69, No. 1, Jan. 1, 1956

Browne, I. C.; Bullough, K.; Evans, S. and Kaiser, T. R.: **Characteristics of radio echoes from meteor trails, Pt. 2, The distribution of meteor magnitudes and masses,** p. 83–97
Billam, E. R. and Browne, I. C.: **Characteristics of radio echoes from meteor trails. IV: Polarization effects,** p. 98–113
Mossop, S. C.: **Sublimation nuclei,** p. 161–164
Mossop, S. C.: **The nucleation of supercooled water by various chemicals,** p. 165–174
Whale, H. A.: **Effective tilts of the ionosphere at places about 1000 km apart,** p. 301–310

Revista de Geofísica, Madrid, Vol. 15, No. 58, April/June 1956

Palomares Casado, Manuel: **Efectos de la corriente aerea en chorro sobre las capas atmosféricas inferiores,** [Effects of the jet stream on the lower atmospheric layers], p. 167–172
Linés, Alberto: **Notas relativas al estado del tiempo durante los meses de Octubre, Noviembre y Diciembre de 1955,** [Notes on the weather during October, November and December 1955], p. 173–187

Rivista di Meteorologia Aeronautica, Vol. 16, No. 4, Oct./Dec. 1956

De Pasquale, Oreste: **La rete attinometrica del Servizio Meteorologico Dell'aeronautica: risultati del primo anno di misure della radiazione globale,** [The actinometric network of the Meteorological Service of the Italian Ministry of Air: results of the first year of global radiation measurements], p. 5–22
Affronti, Filippo: **Su un ricorrente ed intenso fenomeno di surriscaldamento in Sicilia,** [On a recurrent and intense superheating phenomenon in Sicily], p. 23–30
Bilancini, Raoul: **Tavole climatologiche di alcune stazioni Italiane: Domodossola, Milano, Treviso, Alassio, Genova, Bologna,** [Climatic tables for some Italian Stations: Domodossola, Milan, Treviso, Alassio, Genoa, Bologne], p. 31–37
Urbani, Marcello: **Sui cicloni Atlantici influenzanti il Mediterraneo durante l'inverno,** [Atlantic cyclones affecting the Mediterranean during winter], p. 39–41
Bernacca, Edmondo: **Il tempo in Italia nel trimestre Aprile-Giugno 1956,** [Weather in Italy, April/June 1956], p. 43–44
Bellisario, A.: **L'evoluzione della meteorologia dinamica,** [Evolution of dynamic meteorology], p. 62–64
Bellisario, A.: **Le condizioni di volo nella corrente a getto,** [Jet stream flight conditions], p. 64–66
Bilancini, R.: **Il progetto "AROWA,"** [Project AROWA], p. 66–67
Bilancini, R.: **Record di precipitazione in America,** [Record of precipitation in America], p. 67
Bilancini, R.: **La definizione di corrente a getto,** [Definition of the jet stream], p. 67–68
Bilancini, R.: **Coriolis, que de crimes . . . ,** [Coriolis, what crimes . . .], p. 69

Tellus, Stockholm, Vol. 8, No. 3, Aug. 1956

Hansen, Walter: **Theorie zur Errechnung des Wasserstandes und der Strömungen in Randmeeren nebst Anwendungen,** [Theory for calculating water level and currents in peripheral seas, including applications], p. 287–300

Morgan, G. W.: **On the wind-driven ocean circulation,** p. 301–320

Hodgson, J. H. and Cook, J. Irma: **Direction of faulting in the deep-focus Spanish earthquake of March 29, 1954,** p. 321–328

Nishimura, Eiichi and Kishimoto, Yoshimichi: **On the local structural character of the earth's crust,** p. 329–334

Malkus, Joanne Starr: **On the maintenance of the trade winds,** p. 335–350

Best, William H.: **Differences in numerical prognoses resulting from differences in analyses,** p. 351–356

White, Robert M. and Saltzman, Barry: **On conversions between potential and kinetic energy in the atmosphere,** p. 357–363

Adem, Julián: **A series solution for the barotropic vorticity equation and its application in the study of atmospheric vortices,** p. 364–372

Kuo, H.-L.: **On quasi-nondivergent prognostic equations and their integration,** p. 373–383

Thompson, Philip Duncan: **Optimum smoothing of two-dimensional fields,** p. 384–393

Bowen, E. G.: **A relation between meteor showers and the rainfall of Nov. and Dec.,** p. 394–402

Dufour, L.: **Entraînement d'air humide saturé contenant de l'eau liquide dans une masse d'air humide saturé contenant de l'eau liquide,** [Entrainment of moist saturated air containing liquid water in a mass of moist saturated air containing liquid water], p. 403–407

Lehnert, B.: **Electrodynamic effects connected with the motion of a satellite of the earth,** p. 408–409

Kendrew, W. E.: **Blue suns,** p. 410

Vol. 8, No. 4, Nov. 1956

Coachman, L. K.; Hemmingsen, E. and Scholander, P. F.: **Gas enclosures in a temperate glacier,** p. 415–423

Ludlam, F. H. and Saunders, P. M.: **Shower formation in large cumulus,** p. 424–442

Squires, P.: **The micro-structure of cumuli in maritime and continental air,** p. 443–444

Twomey, S.: **Electrification of individual cloud droplets,** p. 445–452

Warner, J. and Twomey, S.: **Use of silver iodide for seeding individual clouds,** p. 453–459

Long, Robert R.: **Solitary waves in the one- and two-fluid systems,** p. 460–471

Nyberg, Alf and Raab, Lars: **Experimental study of the field variation of the eddy conductivity,** p. 472–479

Wexler, H.: **Variations in insolation, general circulation and climate,** p. 480–494

Palmer, Clarence E. and Ohmstede, William D.: **Simultaneous oscillation of barometers along and near the equator,** p. 495–507

Brunberg, E.-Å. and Eckhartt, D.: **Some remarks on the sudden cosmic ray increase on Feb. 23, 1956,** p. 208–512

Current data on the chemical composition of air and precipitation, VII, p. 513–517

Tohoku Univ., Science Reports, 5th Series, Geophysics, Vol. 7, No. 3, March 1956

Kato, Yoshio and Akasofu, Syun-ichi: **Outer atmospheric oscillation and geomagnetic micropulsation,** p. 103–124

Kamiyama, Hiroshi: **Ionospheric changes associated with geomagnetic bays,** p. 125–135

Onishi, Gaishi: **The vertical heat transfer due to large-scale atmospheric disturbances,** p. 165–168

Vol. 7, Supplement, March 1956

Kato, Yoshio and Ossaka, Justo: **Effect of the solar eclipse on the *sq* current of the diurnal variation,** p. 21–29

Kato, Yoshio and Yokoto, Ken-ichi: **Decrease of the electrical conductivity in the ionosphere associated with the solar eclipse,** p. 30–35

Vol. 8, No. 1, Nov. 1956

Kato, Yoshio and Watanabe, Tomiya: **Further study on the cause of giant pulsation,** p. 1–10

Watanabe, Tomiya: **Studies on P.S.C. after the Ashour-Price's model for the ionospheric shielding effect,** p. 11–18

Akasofu, Syun-ichi: **Dispersion relation of magneto-hydrodynamic waves in the ionosphere and its application to shock wave,** p. 24–40
Kamiyama, Hiroshi and Sato, Teruyuki: **Latitudinal effect on the disturbance daily variation in *F*2 layer of the ionosphere,** p. 41–51
Saito, Takayuki: **Measurement of transmissivity of infrared radiation through fog,** p. 52–57
Miura, Akira: **Size distribution of large aerosol particles in the atmosphere,** p. 58–63

Weather, London, Vol. 12, No. 1, Jan. 1957

Goody, R. M.: **The atmosphere of Mars,** p. 3–15
Oliver, J.: **An early self-recording pressure-plate anemometer,** p. 16–21
Cowling, George: **TV weatherman,** p. 22–26
Gloyne, R. W.: **The teaching of meteorology,** p. 32
Smith, Ralph C.: **Another remarkable low humidity,** p. 33

Weatherwise, Boston, Vol. 9, No. 6, Dec. 1956

Wood, C. P. and Breen, G. M.: **Winter weather over Suez,** p. 182
Panofsky, Hans A.: **Theories of the climate change,** p. 183–187
Mook, Conrad P.: **The "Knickerbocker" snowstorm of Jan. 1922 at Washington, D. C.,** p. 188–191
Seamon, L. H. and Bartlett, G. S.: **Climatological extremes,** p. 193–195
Schaefer, Vincent J.: **Production of a diamond dust shower (Simple experiments in atmospheric physics, Pt. 7),** p. 195–197
Bigler, Stuart G.: **Note on the successful identification and tracking of a tornado by radar,** p. 198–201
Reed, Jack W.: **Weather determines blast prediction for atom tests,** p. 202–204
Klein, William H.: **Prevailing tracks of lows and highs (4th of a series of 6 articles),** p. 205–209
Ludlum, David M.: **Drought, then some relief,** p. 210–212

Wetter und Leben, Vienna, Vol. 8, No. 8/11, 1956

Undt, W.: **Der Höhenföhn und seine bioklimatische Bedeutung,** [High-altitude föhn and its bioclimatic importance], p. 159–168
Lauscher, Friedrich: **Gibt es bioklimatisch kalten Föhn?,** [Is there a bioclimatically cold föhn?], p. 168–173
Tollner, Hanns: **Zur Niederschlagsmessung in den Alpen,** [Precipitation measurement in the Alps], p. 173–180
Lauscher, Friedrich and Roller, Maria: **Die Schwankungen der Niederschlagsabhängigkeit von der Seehöhe, beurteilt nach dreissigjährigen Totalisatoren-beobachtungen in den Hohen Tauern,** [Variations in the dependence of precipitation on altitude, determined from 30-year observation of totalizers in the High Taurus Mountains], p. 180–187
Sauberer, F and Dirmhirn, Inge: **Weitere Untersuchungen über die Kaltluftansammlungen in der Doline Gstettner-Alm bei Lunz in Niederösterreich,** [Further investigations of cold air accumulations in the Gstettner-Alm depression near Lunz, lower Austria], p. 187–196
Steinhauser, F.: **Das Mischungsverhältnis in Österreich als klimatologische Grösse,** [Mixing conditions in Austria as a climatological value], p. 196–200
Zawadil, R.: **Die Bedeutung der Schneedecke für das Leben in der Grossstadt,** [Importance of snow cover for the life in a large city], p. 200–206
Topitz, A.: **Zur Bedeutung der Windverhältnisse für die Raumplanung,** [The importance of wind conditions to the planning of industrial housing developments], p. 206–213
King, E.: **Ein Beitrag zum Raumklima in Kraftfahrzeugen,** [Contribution to the climate of automobiles], p. 213–219
Müller, Theodor: **10 Jahre Aranmessung und Aranlehre,** [10 years of aran measurements and theory], p. 219–225
Undt, W.: **Internationale Gesellschaft für Bioklimatologie und Biometeorologie** [International Society for Bioclimatology and Biometeorology], p. 225–231
Manohin, V.: **Winterprognose 1956–57 auf Grund der Klimadaten von Ljubljana** [Winter forecast for 1956–57 on the basis of climatic data at Ljubljana], p. 232–233

Wetterlotse, Hamburg, No. 108, Nov. 1956

Rix, Robert: **Wetternavigation mit einem 10 Knoten-Schiff,** [Weather navigation with a 10-knot ship], p. 217–220
Höller, E.: **Schädensfälle am Ladungsgut und ihre meteorologische Deutung,** [Cases of damage to cargoes and their meteorological significance], p. 222–226

Seilkopf, H.: **Eine "Nullmethode" zur Messung der Windgeschwindigkeit auf See,** [A "null" method for measuring wind velocity at sea], p. 227–231
Seilkopf, H.: **Con Heringsfang in seiner Abhängigkeit von der Witterung,** [Dependence of the herring fishery on weather], p. 232–233
Rodewald, M.: **Auch Schönwetter-Obse sind wichtig,** [Even fine weather observations are important], p. 234–236
Seilkopf, H.: **Eine biologisch wirksame Wetterlage auf der Nordsee im Spätsommer 1956,** [A biologically effective weather situation in the North Sea in late summer 1956], p. 237–239
Schindler, G.: **Nochmals ein Schiffsunfall durch Sonnenuntergang,** [Another ship accident through sunset], p. 239–240

No. 109/110, Dec. 1956

Roll, H. U.: **Die blaue Flagge der Vereinten Nationen wehte über dem Hamburger Hafen,** [The blue flag of the United Nations waves over Hamburg Harbor], p. 241–249
Höller, E.: **Schadensunfälle am Ladungsgut und ihre meteorologische Deutung,** [Cases of damage to cargoes and their meteorological significance], p. 250–261
von Zatorski, Walther and Rodewald, M.: **Zur Routenwahl bei Ballastreisen nach Nordamerika,** [Choice of route for voyages in ballast to North America], p. 261–266
Ein früher Eiswinter in der Bottenwiek, [An early ice winter in the Gulf of Bothnia], p. 266–269
Rodewald, M.: **Jahrestendenzen der Witterung,** [Annual tendencies of weather], p. 270–272

World Meteorological Organization, WMO Bulletin, Vol. 6, No. 1, Jan. 1957

Thornthwaite, C. W.: **The task ahead in climatology,** p. 2–7
Secretary-General's visit to North and South America, p. 7–9
Langlo, K.: **Second session of the Commission for Maritime Meteorology,** p. 10–13
Möller, F.: **Radiation comparisons at Hamburg,** p. 13–16
Activities of Regional Associations, p. 16–17
Treussart, H.: **Technical assistance and meteorology,** p. 18–21
Ashford, O. M.: **World comparison of radiosondes,** p. 21–23
Technical Assistance Programme, p. 23–25
Mörikofer, W.: **International Radiation Conference,** p. 25–26
Publications of the WMO, p. 27–30
Members of the WMO, p. 30
International Geophysical Year, 1957–1958, p. 31–33
Activities of the Technical Commission, p. 33–36
Bourke, P. M. Austin: **Weather and potato blight in Chile,** p. 36–38
Collaboration with other international organizations, p. 38–40
News and notes, p. 40–41
Recent WMO publications, p. 41–42

Zeitschrift für Meteorologie, Berlin, Vol. 10, No. 9, Sept. 1956

Hinzpeter, Hans: **Über die Repräsentanten der Angström-Skala und der Smithsonian-Skala des Obervatoriums Potsdam,** [On the equivalents of the Ångström and Smithsonian scales at Potsdam Observatory], p. 257–263
Teichert, F. and Warmbt, W.: **Ozonmessungen Dresden-Wahnsdorf und Fichtelberg 1954/55,** [Ozone measurements Dresden-Wahnsdorf and Fichtelberg 1954–55], p. 264–277
Geselle, P. and Matzke, H.: **Über Registrierversuche mit elektrischem Strom,** [On recording experiments with electrical currents], p. 278–280
Wehner, Hans: **Auswertung der täglichen Niederschlagszeiten,** [Evaluation of daily rainfall duration], p. 280–281
Schwandt, H. and Müller, G.: **Eine Windhose bei Magdeburg,** [A whirlwind near Magdeburg], p. 284

PART IV. AUTHOR AND SUBJECT INDEXES

In this section will be found reference to the number given at the head of each abstract or entry. In Part I each entry begins with the number 8.2, and in Part II in the Bibliography on Night Airglow each entry begins with the number and letter 8B. This index is divided into three parts:

Index of Authors | Index of Subjects | Index of Geographic Locations

INDEX OF AUTHORS

Abadie, P., 8B–36, 8B–37, 8B–39
Abraham, E. M., 8.2–196
Airglow and aurora, 8B–133
Alexander, L. L., 8.2–316
Allcock, G. McK., 8.2–325
American Met. Soc., 8.2–33
Arakawa, H., 8.2–127, 8.2–263
Armstrong, E. B., 8B–133 to 8B–135
Ashburn, E. V., 8.2–148, 8B–91
Ashmore, S. E., 8.2–246

Bagariatskiĭ, B. A., 8B–136
Baillet, A., 8B–78
Bannon, J. K., 8.2–198
Barbier, D., 8B–22, 8B–61, 8B–62, 8B–78, to 8B–80, 8B–92, 8B–93, 8B–137, 8B–138
Barlow, E. W., 8.2–42
Barnard, G. A., 8.2–230
Barton, J. C., 8.2–159
Batchelor, G. K., 8.2–1, 8.2–179, 8.2–180, 8.2–195, 8.2–197, 8.2–238
Bates, D. R., 8B–23
Battle, W. R. B., 8.2–165
Bauer, F., 8.2–228
Bazzard, G. H., 8.2–291
Beauchamp, R. S. A., 8.2–247
Becker, U., 8.2–153
Beckett, P. H. T., 8.2–260
Behr, A., 8B–75
Belfast. Queen's Univ., 8B–133
Bengston, K. B., 8.2–265
Benzies, G. Y., 8.2–244
Berg, O. E., 8B–139
Bernard, R. G., 8B–94
Berthier, P., 8B–63, 8B–81, 8B–114, 8B–115, 8B–140, 8B–141, 8B–143
Best, A. C., 8.2–219
Bevan, H. C., 8.2–291
Beynon, W. J. G., 8.2–114
Biermann, L., 8B–162
Bigg, F. J., 8.2–214
Blackett, P. M. S., 8B–24
Blamont, J.-E., 8B–116
Bleasdale, A., 8.2–288
Bonacina, L. C. W., 8.2–243
Bonnlander, B. H., 8.2–165
Booth, R. E., 8.2–168, 8.2–236, 8.2–245
Bornstein, R., 8B–73
Boss, G., 8.2–286
Bosson, F., 8B–78
Boudart, M. J., 8B–156
Bowden, K. F., 8.2–38
Bricard, J., 8B–25, 8B–43
Briggs, J., 8.2–98
Britton, G. P., 8.2–122, 8.2–123
Broida, H. P., 8B–95
Brooks, C. E. P., 8.2–229
Brooks, F. A., 8.2–147
Brown, G. M., 8B–50
Brown, R. A., 8.2–115
Brunt, D., 8.2–21
Bull, G. A., 8.2–297, 8.2–302
Bullard, E., 8.2–28
Bushby, F. H., 8.2–119
Businger, J. A., 8.2–121
Byrne, B. J., 8.2–67

Cabannes, J., 8B–3 to 8B–8, 8B–142
Capper, J., 8.2–30
Cario, G., 8B–96
Carter, W. H. N., 8.2–99
Čerenkov, P. A., 8B–24
Chamberlain, J. W., 8.2–149, 8.2–150, 8B–82, 8B–97 to 8B–99, 8B–117
Chaplin, J. H., 8.2–240
Chapman, S., 8B–13, 8B–133
Charney, J. G., 8.2–92
Cherniaev, V. I., 8B–9
Chicago Univ. Weather Forecating Res. Center, 8.2–135
Chicago. Univ. Yerkes Obs., 8B–97
CHuvaev, K. K., 8B–64
Clark, C., 8.2–199
Clarke, C., 8.2–67
Clegg, J. A., 8.2–271, 8.2–272
Commonwealth Air Transport, 8.2–185
Contract AF 19(122)-433, 8B–53, 8B–65, 8B–84
Contract AF 19(122)-478, 8B–87
Contract AF 19(122)-480, 8B–97
Court, G. W. G., 8.2–201
Courtès, G., 8B–116
Coxon, A., 8.2–220
Crawford, A. B., 8.2–11
Crease, J., 8.2–34
Croney, J., 8.2–223
Cronin, H. E., 8B–65, 8B–84
Crossley, A. F., 8.2–200
Currie, B. W., 8B–44

Dalgarno, A., 8B–133
Darbyshire, J., 8.2–132, 8.2–191
Darbyshire, M., 8.2–132
Das, A. K., 8.2–317, 8B–10, 8B–14
Davidson, K. S. M., 8.2–197
Davies, G. L., 8.2–257
Davies, O., 8.2–234
Davies, R. M., 8.2–1, 8.2–179, 8.2–180, 8.2–195, 8.2–197, 8.2–238
Davis, D. N., 8B–51, 8B–90
Deacon, E. L., 8.2–303
Defant, A., 8.2–126
Déjardin, G., 8B–11, 8B–26
de Jong, J. J. G., 8.2–136
Delany, M. J., 8.2–279
Dessauer, F., 8.2–308
Deutsch, E. R., 8.2–272
Dickson, C. N., 8.2–73
Divari, N. B., 8B–40, 8B–83
Donahue, T. M., 8B–118
Drimmel, J., 8.2–93, 8.2–218
Drummond, A. J., 8.2–77, 8.2–79, 8.2–80
Drury, W. H., Jr., 8.2–3
Dryden, W. A., 8.2–120

Dufay, J., 8B–3, 8B–4, 8B–6 to 8B–8, 8B–27 to 8B–29, 8B–41, 8B–52, 8B–93, 8B–100, 8B–119, 8B–142, 8B–143
Dufay, M., 8B–143
Dungey, J. W., 8.2–116
Dunn, R. B., 8B–144
Durst, C. S., 8.2–99, 8.2–297

Edholm, O. G., 8.2–282
Edwards, H. D., 8B–158
Eldridge, R. H., 8.2–22
Elliot, H., 8.2–160
Ellison, T. H., 8.2–180
Elsässer, H., 8B–145
Elvey, C. T., 8B–19, 8B–45, 8B–46, 8B–120
Emery, P. F., 8.2–128
Evans, F., 8.2–73

Farnsworth, A. H., 8B–19
Faucher, G. A., 8.2–311
Faust, H., 8.2–170
Fedorova, N. I., 8B–136
Ferraro, V. C. A., 8.2–161
Feteris, P. J., 8.2–224
Fett, W., 8.2–60, 8.2–61
Fiedler, H., 8.2–83
Fischer, G., 8.2–194
Fleischer, R., 8.2–142
Fletcher, L., 8.2–69
Foderaro, A., 8B–118
Fowler, P. H., 8.2–162
Friedman, H., 8.2–154
Frongia, G., 8B–18
Fuchs, V. E., 8.2–5

Galbraith, W., 8B–121
Garrigue, H., 8B–12, 8B–15
Garrod, M. P., 8.2–216
Garvin, D., 8B–156
Gauzit, J., 8B–8
Gaydon, A. G., 8B–95, 8B–146
Gebbie, H. A., 8.2–81
Geissler, D., 8.2–163
Geo-Science, Inc., 8B–53, 8B–65, 8B–84
Gilchrist, B., 8.2–92
Glasspoole, J., 8.2–248, 8.2–264
Goedecke, E., 8.2–264
Götz, F. W. P., 8B–20
Gold, L. W., 8.2–242
Gold, T., 8.2–164
Gol'danskiĭ, V. I., 8B–101
Goldie, N., 8.2–110
Goode, J. E., 8.2–210
Goodman, A., 8.2–235
Gordon, E. D., 8.2–260
Gorham, E., 8.2–104
Goss, J. R., 8.2–147
Graffunder, W., 8.2–308
Grandmontagne, R., 8B–16, 8B–17, 8B–30
Grayson, A. J., 8.2–105
Gt. Brit. Hydrographic Dept., 8.2–2
Gt. Brit. Met. Office, 8.2–23
Gt. Brit. Met. Office. Brit. Climatology Branch, 8.2–166
Green, F. H. W., 8.2–207
Green, H. L., 8.2–238
Gregor, A., 8.2–33
Gregory, S., 8.2–231
Gribbon, P. W. F., 8.2–151
Griffiths, D. H., 8.2–272
Gush, H. P., 8B–122

Haarländer, H., 8.2–130
Häberlin, C., 8.2–24
Hannell, F. G., 8.2–265
Hanson, W. R., 8.2–27
Harang, L., 8.2–323
Hay, J. S., 8.2–181
Hay, R. F. M., 8.2–192
Hayward, L. Q., 8.2–11
Heap, J., 8.2–9
Heaps, H. S., 8B–102
Heffernan, K. J., 8.2–102
Heines, J. M., 8.2–129
Hentschel, G., 8.2–285
Hepburn, F., 8.2–318
Herman, L., 8B–523
Herman, R., 8B–123
Herrinck, P., 8B–85
Herzberg, G., 8B–102
Hey, J. S., 8.2–87
Heywood, G. S. P., 8.2–25
Higuchi, K., 8.2–241
Hines, C. O., 8.2–293
Hinzpeter, M., 8.2–18
Hoffmeister, C., 8B–54
Hopkinson, R. G., 8.2–295
Horney, G., 8.2–287
Houghton, D. M., 8.2–174, 8.2–188
Houtgast, J., 8B–66
Hoyle, F., 8B–31
Huckle, V. M., 8.2–119
Hudson, J. P., 8.2–47
Hughes, P., 8.2–193
Hulburt, E. O., 8B–42, 8B–55
Hunten, D. M., 8.2–103
Hurst, G. W., 8.2–316
Huruhata, M., 8B–86, 8B–124, 8B–147

Imbert, B., 8.2–12
Inst. of Civil Engrs., London. Hydraulics Committee, 8.2–249
Instrument Practice, 8.2–85
International Conference on the Emission Spectra of the Night Sky and Aurorae, 8B–32
Ivins, J. D., 8.2–45

James, D. G., 8.2–302
Jarman, R. T., 8.2–82
Jatar, D. P., 8.2–314
Jelley, J. V., 8B–121
Jenkinson, A. F., 8.2–70, 8.2–232
Johnson, F. S., 8.2–146
Jones, A. V., 8.2–152, 8B–122
Jones, R. A., 8.2–198
Jones, R. F., 8.2–100
Journal of Atmospheric and Terrestrial Physics, 8B–133
Journal of Glaciology, 8.2–44

Kästner, S., 8.2–326
Kalle, K., 8.2–40
Kaplan, J., 8.2–13, 8B–67
Karandikar, R. V., 8B–148
Karimov, M. G., 8B–47, 8B–68
Kasemir, H. W., 8.2–307
Kastler, A., 8B–25, 8B–43
Kauf, H., 8.2–75
Keller-Hammer, J., 8.2–202
Khvostikov, I. A., 8B–9, 8B–33, 8B–34
Knizek, F., 8.2–97
Koczy, F. F., 8.2–41
Köhn, M., 8.2–59
Köntopp, H., 8.2–275
Kohls, F. F., 8B–65, 8B–84
Koomen, M. J., 8B–139, 8B–149 to 8B–151
Krasovskiĭ, V. I., 8B–103, 8B–152 to 8B–155
Kraul, W., 8.2–155
Küchle-Scheidemantel, I., 8.2–261
Kühn, U., 8.2–133
Kuettner, J., 8.2–313
Kuiper, G. P. (*ed.*), 8B–76, 8B–97
Kummerow, E., 8.2–268
Kurth, G., 8.2–280
Kvifte, G. I., 8B–38, 8B–69

LaChapelle, E. R., 8.2–84
Lallemand, A., 8B–78
Lamb, H. H., 8.2–122, 8.2–123
Landolt, H. H., 8B–73
Lane, W. R., 8.2–238
Laub, J., 8.2–308
Law, F., 8.2–289
Lawrence, E. N., 8.2–258
Lawther, P. J., 8.2–109
Legget, R. F., 8.2–173
Lenoble, J., 8B–104
Lettau, H., 8.2–121
Lewis, R. P. W., 8.2–232
Lock, C., 8B–149
Loewe, F., 8.2–6, 8.2–172
Ludlam, F. H., 8.2–65, 8.2–215

McDermott, N., 8.2–45
McElhinny, M. W., 8.2–310

Mackenzie, J. K., 8.2–209
MacKenzie, M. H., 8B–53, 8B–65, 8B–84
McKinley, J. D., Jr., 8B–156
Maclaren, C. F., 8.2–138
McWilliams, S., 8.2–15
Maede, H., 8.2–171
Maguery, J., 8B–78
Majendie, A. M. A., 8.2–301
Maling, D. H., 8.2–7
Malsch, W., 8.2–320
Manley, G., 8.2–71, 8.2–273
Manring, E. R., 8B–113, 8B–125, 8B–144, 8B–157
Marine Observer, 8.2–141, 8.2–208, 8.2–294, 8.2–295, 8.2–300, 8.2–305, 8.2–306
Martin, A. E., 8.2–88
Martin, L. H., 8.2–325
Mason, B. J., 8.2–65, 8.2–224
Mason, J. B. M., 8.2–53
Matheson, J. C., 8.2–205
Matthews, L. S., 8.2–63
Mayot, M., 8B–70
Meade, P. J., 8.2–106
Meffert, M. E., 8.2–144
Meinel, A. B., 8B–48, 8B–56, 8B–76, 8B–97, 8B–126, 8B–127
Meredith, L., 8B–139
Mertins, H. O., 8.2–50, 8.2–189
Meteorological Magazine, 8.2–137, 8.2–312
Miller, A. A., 8.2–255
Minnis, C. M., 8.2–291, 8.2–292, 8.2–309
Mitra, S. K., 8B–71
Möller, H. G., 8.2–117
Morikofer, W., 8.2–33
Moffitt, B. J., 8.2–187
Moore, H. I., 8.2–259
Morignat, B., 8B–141, 8B–143
Morrison, J. F., 8.2–284
Mügge, R., 8.2–175
Murgatroyd, R. J., 8.2–74, 8.2–216

Nagel, J. F., 8.2–237
Nakamura, T., 8B–124, 8B–147
Nature, 8.2–251, 8.2–254
Negaard, B. J., 8.2–150
Neis, B., 8.2–32
Neumann, G., 8.2–194
Neumann, J., 8.2–233
Neuwirth, R., 8.2–283
Nicholls, R. W., 8B–105
Nicodemus, F. E., 8B–158
Nicolet, M., 8B–35, 8B–57, 8B–72, 8B–106
Nonweiler, T., 8.2–19

Oddie, B. C. V., 8.2–101
Ogawa, M., 8B–107
Oliver, N. J., 8B–82
Omholt, A., 8.2–112
Osherovich, A. L., 8B–108

Packer, D. M., 8B–149, 8B–151
Paetzold, H. K., 8.2–113
Panschin, K. B., 8B–9
Panzer, W., 8.2–31
Parker, A., 8.2–107
Pasquill, F., 8.2–182
Paton, J., 8.2–322
Pearse, R. W. B., 8B–21, 8B–109
Penman, H. L., 8.2–211
Penndorf, R., 8B–73
Pereira, H. C., 8.2–239
Peterson, A. M., 8.2–199
Petterssen, S., 8.2–26
Pettit, H. B., 8B–74, 8B–88 to 8B–90, 8B–110, 8B–113, 8B–125, 8B–130, 8B–157
Phillips, J. G., 8B–159
Physical Society of London, 8B–32
Piper, H., 8.2–134
Pittsburgh. Univ. Spectroscopy Lab., 8B–87
Priester, W., 8.2–16
Priestley, C. H. B., 8.2–106
Priestley, R., 8.2–14
Prohaska, F., 8.2–176
Pütter, P. St., 8.2–201
Putnins, P., 8.2–167

Rathbone, K. C., 8.2–29
Rathjens, C., 8.2–269
Rayleigh, (R. J. S.) Lord, 8B–1
Reisig, G. H. R., 8.2–64
Resnik, R., 8B–87
Rettig, H., 8.2–253
Reuter, H., 8.2–97
Reynolds, G., 8.2–186, 8.2–230
Richter, J., 8.2–177
Rider, N. E., 8.2–212
Rigg, J. B., 8.2–26
Roach, F. E., 8B–74, 8B–88 to 8B–90, 8B–110 to 8B–113, 8B–126 to 8B–128, 8B–130, 8B–160
Roberts, J. A., 8.2–298
Robin, G., 8.2–10
Rodewald, M., 8.2–89, 8.2–131, 8.2–178, 8.2–190
Rodionov, S. F., 8B–108
Roesler, F. L., 8B–117
Rogers, P., 8.2–30, 8.2–202
Roll, H. U., 8.2–36, 8.2–194
Ross, J., 8.2–139
Rothwell, P., 8.2–160
Royal Astronomical Society, 8.2–213
Royal Society of London, Gassiot Committee, 8B–32
Rudeforth, B. F., 8.2–252
Saffman, P. G., 8.2–183
Sagalyn, R. C., 8.2–311
Saha, A. K., 8B–58
St. Amand, P., 8B–90, 8B–110, 8B–113, 8B–129 to 8B–131, 8B–161
Sandner, W., 8.2–324
Sarjant, R. J., 8.2–54
Sarson, P. B., 8.2–217
Saward, A. C., 8.2–52
Schell, I. I., 8.2–94, 8.2–95
Scherhag, R., 8.2–32
Schneider-Carius, K., 8.2–111
Schnelle, F., 8.2–169
Schonland, B. F. J., 8.2–319
Schütt, P., 8.2–49
Schulze, W., 8.2–66
Schweitzer, H., 8.2–20
Schwerdtfeger, W., 8.2–176
Scolnik, R., 8B–139, 8B–149, 8B–150
Scorer, R. S., 8.2–26, 8.2–203, 8.2–221
Scrimger, J. A., 8.2–103
Seaton, S. L., 8B–49, 8B–84
Seemann, —, 8.2–143
Seilkopf, H., 8.2–90
Sharma, H. D., 8.2–314
Shellard, H. C., 8.2–166
Shepard, F. P., 8.2–39
Sheppard, P. A., 8.2–1, 8.2–204
Shuman, F. G., 8.2–92
Siedentopf, H., 8B–75, 8B–145
Skinner, N. J., 8.2–118
Smith, E. J., 8.2–102
Smith, L. P., 8.2–206
Smith, P. G., 8.2–87
Smith, W., 8.2–38
Smithard, E. H. R., 8.2–108
Smokeless Air, 8.2–51, 8.2–55, 8.2–56
Sommer, L. A., 8B–2
Spence, E. J., 8.2–57
Spicer, W. E., 8B–132
Spink, P. C., 8.2–243
Stein, S., 8B–87
Steinhauser, F., 8.2–226
Stille, U., 8B–96
Stockhausen, J. H., 8.2–159
Stratmann, H., 8.2–144
Straube, G., 8.2–58
Strøm, K., 8.2–270
Suess, H. E., 8.2–39
Sutcliffe, R. C., 8.2–124
Sutton, O. G., 8.2–33
Swanson, W., 8.2–91
Swings, P., 8B–76
Szendrei, M. E., 8.2–310

Tanabe, H., 8B–124, 8B–147
Tcheng, M.-L., 8B–28, 8B–100, 8B–119
Teichert, F., 8.2–86
ten Brüggencate, P., 8B–162

Thomas, J. O., 8.2–114
Thomas, R. G., 8.2–281
Thompson, H. R., 8.2–165
Thomsen, W., 8.2–37
Thomson, D. H., 8.2–225
Tönsberg, E., 8B–38
Toms, A. M., 8.2–235
Toperczer, M., 8.2–17
Tousey, R., 8.2–156, 8B–149, 8B–150, 8B–151
Townsend, A. A., 8.2–179
Trenkle, H., 8.2–125
Treshnikov, A. F., 8.2–4
Tribble, D. T., 8.2–62, 8.2–222
Trischler, F., 8.2–227
Trombe, F., 8.2–145
Trowell, G. F., 8.2–72
Tucker, G. B., 8.2–184
Turner, J. S., 8.2–183

Uhlig, S., 8.2–96
Ursell, F., 8.2–195

van der Bijl, W., 8.2–290
Vanasse, G. A., 8.2–81
Vas, O., 8.2–250
Vassy, A., 8B–36, 8B–37, 8B–39, 8B–77, 8B–89
Vassy, E., 8B–36, 8B–37, 8B–39, 8B–77, 8B–89
Vegard, L., 8B–38
Veryard, R. G., 8.2–262
Voigt, H. H., 8.2–157
Volz, F., 8.2–158, 8.2–299
von Essen, R., 8.2–8
Vowinckel, E., 8.2–278

Waddington, C. J., 8.2–162
Walden, H., 8.2–194
Waller, R. E., 8.2–109
Wallington, C. E., 8.2–140
Wark, D. Q., 8.2–304
Waterhouse, F. L., 8.2–279
Watkins, L. H., 8.2–68
Weather, 8.2–26, 8.2–256
Webb, C. G., 8.2–76
Wegener, K., 8.2–78
Weickmann, L., 8.2–33
Weldon, R. G., 8B–113
Wellington, P. S., 8.2–46
Wilcox, J. B., 8B–59
Wild, J. P., 8.2–298
Wilkinson, M., 8.2–203
Williams, D. R., 8B–88, 8B–89, 8B–90, 8B–93, 8B–110, 8B–113, 8B–130
Williams, I. H., 8.2–47
Wilson, A. R., 8.2–276
Wilson, R. K., 8.2–48
Wolf, F., 8.2–321
Wood, H. S., 8.2–315
Wooding, R. A., 8.2–43
World Met. Organization, 8.2–33
Wright, R. W., 8.2–118
Würfel, H., 8.2–277
Wüst, G., 8.2–35
Wyllie, P. J., 8.2–267
Wyndham, C. H., 8.2–284

Yerg, D. G., 8B–53
Yonezawa, T., 8B–60

Zenker, H., 8.2–274
Zhdanov, G. B., 8B–101
Zschörner, H., 8.2–113

INDEX OF SUBJECTS

Ablation, 8.2–6
Absorption, 8B–109
Acoustical propagation, 8.2–326
Addresses, 8.2–14, 8.2–255
Agricultural climatology, 8.2–259
Agrometeorological stations, 8.2–72
Air surveying, 8.2–8
Airflow over mountains, 8.2–204
Airglow investigations, 8B–84
Airglow symposia, 8B–133
Airplane instrumentation, 8.2–74
Airplane meteorological research, 8.2–74
Airplane observations, 8.2–216
Annual emission spectra variations, 8B–6, 8B–17
Annual night airglow variations, 8B–18
Annual pressure variations, 8.2–176
Annual reports, 8.2–23
Annual summaries, 8.2–72
Antarctic expeditions, 8.2–5, 8.2–7
Applied climatology, 8.2–254, 8.2–255
Arctic sea ice, 8.2–95
Argon, 8B–132
Artificial rainfall experiments, 8.2–101
Astronautics, 8.2–19
Atmospheric circulation, 8.2–122, 8.2–123, 8.2–171
Atmospheric composition, 8B–58
Atmospheric composition measurement, 8.2–88
Atmospheric pollutants, 8.2–104
Atmospheric pollution effects, 8.2–105, 8.2–107, 8.2–108
Atmospheric radiation, 8.2–147
Atmospheric scattering, 8B–91
Atmospheric turbulence, 8.2–180
Atomic emissions in night airglow, 8B–110
Atomic explosions, 8.2–209
Atomic oxygen, 8B–10, 8B–51
Atomic oxygen recombination, 8B–152
Atomic radiation, 8B–74
Auroral effects on ionosphere, 8.2–112
Auroral emission, 8B–35, 8B–36, 8B–37
Auroral frequencies, 8.2–324
Auroral heights, 8.2–323, 8B–19
Auroral luminescence, 8.2–148
Auroral particles, 8B–31
Auroral physics research, 8B–32, 8B–38
Auroral-solar relationships, 8.2–322
Auroral spectra, 8B–34, 8B–38, 8B–46, 8B–56, 8B–47, 8B–94, 8B–97, 8B–106, 8B–136
Auroral spectroscopy, 8B–29
Auroral theories, 8B–13
Auroras, 8.2–322, 8B–1, 8B–19, 8B–27, 8B–34, 8B–44, 8B–49, 8B–120
Autoregressive series, 8.2–70

Ball lightning, 8.2–312, 8.2–320, 8.2–321
Barley dormancy, 8.2–46
Barotropic tendency equation, 8.2–93
Beaufort scale, 8.2–177
Bergschrund temperatures, 8.2–165
Bioclimatological institutions, 8.2–24
Bioclimatology, 8.2–274, 8.2–277, 8.2–283, 8.2–285
Bioclimatology of plants, 8.2–281
Biography, 8.2–1, 8.2–28, 8.2–29, 8.2–30, 8.2–31, 8.2–319
Body temperature, 8.2–284
Bogs, 8.2–3
Bronchitis, 8.2–109

Bubble mechanics, 8.2–238
Building climatology, 8.2–273
Building materials, 8.2–12

Capper, J., 8.2–30
Carbon monoxide in stratosphere, 8B–22
Cargo protection, 8.2–205
Cargo ventilation, 8.2–205
Čerenkov radiation, 8B–24, 8B–101, 8B–121
Chemical Defence Experimental Estab., Porton, 8.2–182
Cirrus clouds, 8.2–215
Climatic change theories, 8.2–262
Climatic data, 8.2–256
Climatic effects, 8.2–286
Climatic surveys, 8.2–278
Climatic trends, 8.2–265
Climatic variations, 8.2–264
Cloud condensation on aircraft, 8.2–217
Cloud dissolution, 8.2–221
Cloudiness, 8.2–62
Coal mine instruments, 8.2–85
Coalescence theory, 8.2–224
Coastal climates, 8.2–274
Cod fishing, 8.2–50
Cold lows aloft, 8.2–133
Cold poles, 8.2–171
Colliery warnings, 8.2–99
Compendium articles, 8B–55
Compendiums, 8B–32
Condensation trail forecasting, 8.2–98, 8.2–100
Conferences, 8.2–51, 8.2–54, 8.2–141
Continental effects, 8.2–170
Corona radiation, 8.2–153
Coronas, 8.2–306
Corpuscular radiation, 8.2–161, 8B–60
Cosmic influences, 8.2–290
Cosmic ray asymmetry, 8.2–160
Cosmic ray emission, 8B–24
Cosmic ray intensity, 8.2–162
Cosmic ray luminosity, 8B–101
Cosmic ray showers, 8.2–163
Cosmic ray variations, 8.2–160
Cotton pests, 8.2–235
Cumulonimbus development, 8.2–65
Cyclone-anticyclone structure, 8.2–111
Cyclone development, 8.2–134

Dams, 8.2–250
Depressions, 8.2–188
Desert bioclimatology, 8.2–284
Desiccation, 8.2–46
Development theory, 8.2–130
Dew formation, 8.2–218
Dew measurement techniques, 8.2–83
Diffuse radiation, 8B–104
Diffusion corrections, 8B–70
Diphenyl ether, 8.2–76
Diurnal emission spectra variations, 8B–29, 8B–134
Drop properties, 8.2–238
Droplet coagulation, 8.2–183
Drought, 8.2–236
Drug plant yields, 8.2–286
Dust collecting techniques, 8.2–85
Dust devils, 8.2–137, 8.2–139
Dust haze, 8.2–302
Dust meters, 8.2–86
Dynamic meteorology, 8.2–126
Dynamic oceanography, 8.2–126

E layer, 8B–60
Earth's corona, 8B–38
Easterly jet stream, 8.2–128
Eclipse, June 30, 1954, 8B–149
Eclipse effects on ionosphere, 8.2–117, 8.2–291, 8.2–292
Eddy flux, 8.2–120
Electrical conductivity of air, 8.2–311
Electrical conductivity of rivers, 8.2–247
Electrical discharges, 8.2–314, 8.2–315
Electrophotometric observations, 8B–65
Emission layer height determination, 8B–158
Emission layer heights, 8B–28, 8B–36, 8B–37, 8B–59, 8B–61, 8B–72, 8B–86, 8B–100, 8B–118, 8B–119, 8B–124, 8B–126, 8B–127, 8B–130, 8B–145, 8B–147
Emission layer temperature, 8B–159
Emission spectra, 8B–32, 8B–98, 8B–100, 8B–102, 8B–116
Equations of motion, 8.2–92
Equatorial ionosphere, 8.2–118
Evaporation research, 8.2–181
Expeditions, 8.2–11, 8.2–73
Extraterrestrial influences, 8B–31

F layer, 8.2–116, 8.2–310
Fabry-Perot étalon, 8B–142, 8B–148
Firedamp, 8.2–99
Firn temperatures, 8.2–6
5577 Å line [OI], 8B–150
Flocciform clouds, 8.2–215
Floods, 8.2–251
Fog mortality, 8.2–108
Fog precipitation, 8.2–237
Forbidden [OI] lines, 8B–14
Forest effects on runoff, 8.2–288, 8.2–289
Forest protection, 8.2–49
Forestry, 8.2–105
Freezing nuclei, 8.2–216
Frictional effects, 8.2–178
Frost belts, 8.2–169
Frost forecasting, 8.2–147
Frost smoke, 8.2–220

Gale frequency data, 8.2–189
Gales, 8.2–188
Geological climates, 8.2–271
Geomagnetic effects, 8.2–161
Geophysical conferences, 8.2–20
Geostrophic wind errors, 8.2–200
Geostrophic wind scales, 8.2–63
Glacial periods, 8.2–268, 8.2–269, 8.2–270
Glacier retreat, 8.2–267
Glacier variations, 8.2–266
Glaciology, 8.2–44
Gliding meteorology, 8.2–141
Green auroral line, 8B–34, 8B–46
Green corona radiation, 8.2–155
Green emission layer temperature, 8B–148
Green flash, 8.2–300, 8.2–301
Green line emission, 8B–93
Greenhouse radiation, 8.2–143
Gypsum hygrometers, 8.2–59

Hailstones, 8.2–244
Hailstorms, 8.2–245
Halley, E., 8.2–28
Halos, 8.2–305
Haze layers aloft, 8.2–209
Heart disease, 8.2–57
Heat balance, 8.2–97
Heating, 8.2–51
Herzberg bands of O_2, 8B–146
Historic weather records, 8.2–71
History of British Met. Office, 8.2–21
History of meteorology, 8.2–30
Human climatology, 8.2–280
Humidity effects, 8.2–57
Humidity extremes, 8.2–207, 8.2–208
Hydrodynamics, 8.2–238
Hydrography, 8.2–252
Hydrologic cycle, 8.2–124, 8.2–213
Hydrology, 8.2–248, 8.2–249
Hydroxyl (OH) emissions, 8B–48, 8B–52, 8B–117, 8B–134, 8B–140, 8B–154, 8B–155, 8B–156

Ice accretion on ships, 8.2–192
Ice drift stations, 8.2–4
Icing of aircraft, 8.2–209
Icing of aircraft experiments, 8.2–214
Illumination meters, 8.2–80
Indoor air, 8.2–308
Indoor climates, 8.2–277
Infrared spectroscopy, 8.2–81
Institution of Water Engineers, 8.2–248
Instrument standardization, 8.2–75
International Auroral Conference, London, 1947, 8B–32
International Geophysical Year, 1957–1958, 8.2–10
International Geophysical Year airglow manuals, 8B–160
International Geophysical Year program, 8.2–9, 8.2–14
International Polar Years, 8.2–10
International Society of Bioclimatology and Biometeorology, 8.2–279
Interpolation errors, 8.2–69
Interstellar space radiations, 8B–31
Ion counters, 8.2–308
Ion recombination, 8.2–309, 8.2–310
Ion variations, 8.2–308
Ionization anemometers, 8.2–85
Ionization phenomena, 8B–35
Ionospheric absorption measurement, 8.2–118
Ionospheric diffusion, 8.2–116
Ionospheric disturbances, 8B–75
Ionospheric drift, 8.2–199
Ionospheric effects, 8.2–298
Ionospheric electron density, 8.2–114
Ionospheric layers, 8B–39
Ionospheric research, 8B–60
Ionospheric structure, 8B–35
Ionospheric temperatures, 8B–38
Ionospheric wind measurement, 8.2–210
Irrigation needs, 8.2–212

Jet aircraft, 8.2–98, 8.2–100
Jet stream height, 8.2–127
Jet stream navigation, 8.2–129

Klute, F., 8.2–31

Laboratory airglow spectra, 8B–67
Latitude effects on night airglow, 8B–39
Laws, 8.2–55
Lee waves, 8.2–203
Light diffusion, 8B–62
Lightning, 8.2–312
Lightning research, 8.2–318
Lightning strokes, 8.2–317
Lightning strokes on airplanes, 8.2–316
Local climates, 8.2–257, 8.2–260
Local winds, 8.2–190, 8.2–287
Long range forecasting, 8.2–94, 8.2–95
Long wave spectrum of night airglow, 8B–2
Long waves, 8.2–126
Low level jet stream, 8.2–127
Luminescent layers, 8B–8
Lunar ionospheric tides, 8.2–115

Magnetic observatories, 8.2–17
Magnetic storms, 8.2–161, 8B–75
Marine broadcasts, 8.2–90
Marine climatology, 8.2–2
Maudheim Expedition, 1949–52, 8.2–8
Maximum temperature forecasting, 8.2–97
Mechanics, 8.2–1
Medical meteorology, 8.2–58
Meridional circulation, 8.2–124
Meteor echoes, 8.2–293
Meteor trails, 8.2–294
Meteoric dust, 8.2–152, 8B–54
Meteorological conferences, 8.2–20
Meteorological exhibitions, 8.2–27
Meteorological expeditions, 8.2–50
Meteorological research flight, 8.2–74
Meteorological services, 8.2–22
Meteorology of Hong Kong, 8.2–25
Mirages, 8.2–296, 8.2–297
Molecular oxygen bands, 8B–7

Negative condensation trails, 8.2–222
Neis, B., 8.2–32
Nervous system, 8.2–58
Night airglow, 8.2–149, 8.2–150, 8B–1 to 8B–162
Night airglow bibliographies, 8B–71, 8B–87, 8B–97, 8B–128
Night airglow brightness, 8B–11
Night airglow data, 8B–85
Night airglow distribution with height, 8B–139, 8B–150
Night airglow drifting, 8B–124
Night airglow-eclipse relationships, 8B–149
Night airglow emission, 8B–14
Night airglow from cosmic rays, 8B–101
Night airglow infrared spectrum, 8B–41, 8B–48, 8B–52, 8B–67, 8B–117, 8B–122, 8B–136, 8B–152, 8B–154
Night airglow instrumentation, 8B–129
Night airglow intensities, 8B–18, 8B–30, 8B–36
Night airglow intensity distribution, 8B–16
Night airglow intensity variations, 8B–9, 8B–12, 8B–15, 8B–86, 8B–125, 8B–138, 8B–140, 8B–141, 8B–157
Night airglow-ionosphere relationships, 8B–131
Night airglow measurements, 8B–66, 8B–93, 8B–108, 8B–151
Night airglow network for IGY, 8B–111
Night airglow observation, 8B–85, 8B–160
Night airglow photometers, 8B–78, 8B–144, 8B–151, 8B–161
Night airglow photometry, 8B–16, 8B–61, 8B–66, 8B–70, 8B–79, 8B–116, 8B–128, 8B–138, 8B–145, 8B–157, 8B–160
Night airglow program in IGY 8B–153
Night airglow research, 8B–111
Night airglow simulation, 8B–146
Night airglow spectrum, 8B–2, 8B–3, 8B–4, 8B–5, 8B–7, 8B–8, 8B–10, 8B–17, 8B–21, 8B–45, 8B–56, 8B–47, 8B–56, 8B–61, 8B–68, 8B–72, 8B–76, 8B–80, 8B–81, 8B–82, 8B–90, 8B–92, 8B–94, 8B–99, 8B–105, 8B–106, 8B–107, 8B–110, 8B–114
Night airglow theories, 8B–13, 8B–131
Night airglow variations, 8B–141
Night sky brightness, 8B–40, 8B–59, 8B–104, 8B–119
Night sky brightness heights, 8B–68
Night sky brightness measurement, 8B–30, 8B–44
Night sky continuum, 8B–82
Night sky emission theories, 8B–23, 8B–121

Night sky infrared radiation, 8B–103
Night sky photometers, 8B–144
Night sky radiation, 8B–62
Night sky spectra variations, 8B–6, 8B–23
Night sky spectrophotometry, 8B–5
Night sky spectroscopy, 8B–3, 8B–22, 8B–24, 8B–26, 8B–29, 8B–32
Nitrogen spectra, 8B–94, 8B–105
Nocturnal radiation, 8B–43, 8B–55
Nuclei height variations, 8.2–311
Numerical forecasting, 8.2–92
Numerical forecasting techniques, 8.2–119

Obituaries, 8.2–32, 8.2–33
Observers manuals, 8B–160
Ocean currents, 8.2–42
Ocean wave heights, 8.2–36
Ocean wave propagation, 8.2–34
Ocean wave spectra, 8.2–194
Oceanic effects, 8.2–170
Oceanic vertical diffusion, 8.2–41
Oceanographic research, 8.2–35
Offshore winds, 8.2–187
Orchards, 8.2–210
Orographic turbulence, 8.2–202
Outer atmosphere structure, 8.2–304
Oxygen bands, 8B–5, 8B–95, 8B–115
Oxygen spectra, 8.2–151
Ozone variations, 8.2–113

Paleoclimates, 8.2–272
Paleomagnetism, 8.2–271, 8.2–272
Permafrost research, 8.2–173
"Petula" Expedition, 1953–54, 8.2–73
Photoelectric observation, 8B–135
Photoluminescence, 8B–33
Photometric emission measurement, 8B–144
Physiological climatology, 8.2–282
Plant growth, 8.2–47
Pluvial periods, 8.2–234
Postglacial period, 8.2–39
Potato blight forecasting, 8.2–96
Potato storage, 8.2–276
Potato yield, 8.2–45
Potential evapotranspiration, 8.2–212
Potential gradient variations, 8.2–307
Precipitation frequencies, 8.2–232
Pressure distribution, 8.2–228
Pressure effects, 8.2–99
Pressure fields, 8.2–130
Pressure fluctuations, 8.2–175
Purple light, 8.2–303
Pyrheliometry, 8.2–77

Quaternary climates, 8.2–3

Radar analysis of clouds, 8.2–65
Radar echoes from sea, 8.2–223
Radar precipitation echoes, 8.2–66, 8.2–223, 8.2–224
Radiation, 8B–69
Radiation balance, 8.2–142
Radiation calculations, 8.2–60
Radiation filters, 8B–74
Radiation instruments, 8.2–78, 8.2–79
Radiation nomograms, 8.2–60
Radiation research, 8.2–78
Radiative transfer, 8B–62
Radio-direction Finding Conference, 8.2–18
Radio observatories, 8.2–16
Radio star scintillation, 8.2–298
Radioactivity of sea water, 8.2–41
Rain composition, 8.2–104
Rainday distribution, 8.2–227
Raindays, 8.2–226
Raindrop measurement, 8.2–82
Rainfall, 8.2–225
Rainfall frequency distribution, 8.2–223
Rainfall intensity distribution, 8.2–249
Rainfall measurement accuracy, 8.2–68
Rainfall observation, 8.2–249
Rainfall of Victoria, Australia, 8.2–48
Rainfall periodicities, 8.2–229
Rainfall trends, 8.2–230, 8.2–231, 8.2–263
Rainstorms, 8.2–235
Rainy seasons, 8.2–228
Raspberries, 8.2–47
Recombination processes, 8.2–112
Recording photometers, 8B–78, 8B–144
Red emission lines, 8B–142
Red spectrum of night airglow, 8B–123
Relative humidity variations, 8.2–206
Research surveys, 8.2–1
Resonance absorption, 8B–118
River flow, 8.2–247
Rocket airglow data, 8B–139, 8B–150
Rocket observation techniques, 8.2–64, 8.2–154, 8.2–156
Rocket research, 8.2–157
Rockets, 8B–158
Runoff, 8.2–249

Sailing directions, 8.2–2
Sailing ships, 8.2–197
Sanitary inspection, 8.2–52
Satellite observatories, 8.2–19
Savart-Lyot polariscope, 8B–25
Scintillation, 8B–69
Sea level variations, 8.2–39
Sea surfaces, 8.2–38
Sea temperature, 8.2–38
Sea temperature profiles, 8.2–174
Sea water composition, 8.2–40
Seasonal emission spectra variations, 8B–115
Seismic stations, 8.2–17
Severe winters, 8.2–168
Sferics, 8.2–325
Sferics thunderstorm location, 8.2–67
Ships' weather messages, 8.2–89, 8.2–91
Shipwrecks, 8.2–190, 8.2–192
Showers of fish, 8.2–246
Silver iodide decay, 8.2–102
Sitka spruce, 8.2–289
Sky colors, 8.2–299
Sky pyronographs, 8.2–79
Slope microclimatology, 8.2–169
Smog, 8.2–109
Smog effects, 8.2–107
Smoke abatement, 8.2–51 to 8.2–56
Smoke plumes, 8.2–106
Snow cover charts, 8.2–261
Snow cover duration, 8.2–243
Snow cover water content instruments, 8.2–84
Snow crystals, 8.2–240, 8.2–241
Snow mechanics, 8.2–242
Snowflake coalescence, 8.2–241
Societies, 8.2–279
Sodium absorption, 8.2–103
Sodium D line, 8B–96, 8B–107, 8B–125, 8B–150
Sodium in atmosphere, 8.2–103, 8.2–149, 8.2–150
Sodium spectra, 8B–58, 8B–63
Soil moisture availability, 8.2–211

Soil moisture measurement, 8.2–59
Soil moisture variations, 8.2–210, 8.2–253
Soil permeability, 8.2–239
Solar constant, 8.2–146
Solar corona temperature, 8B–162
Solar eclipse effects, 8.2–309, 8.2–310
Solar emanations, 8.2–164
Solar energy symposia, 8.2–144
Solar energy utilization, 8.2–144, 8.2–145
Solar flare effects, 8.2–160
Solar flares, 8.2–164, 8B–31
Solar radiation observations, 8B–85
Spectral analysis of night airglow, 8B–11
Spectral line 5577 Å [OI], 8B–51, 8B–66, 8B–88 to 8B–90, 8B–112, 8B–113, 8B–135, 8B–139, 8B–147, 8B–149, 8B–150
Spectral line 5577 A [OI] intensity variations, 8B–157
Spectral line width, 8B–159
Spectrographic measurement of night airglow, 8B–143
Spectrophotometric observations, 8B–12, 8B–19, 8B–80, 8B–115, 8B–140
Spectroscopic studies of skylight, 8B–33
Spectroscopy, 8B–52
Standard deviation computation, 8.2–70
Statistical methods, 8.2–110
Storm frequency data, 8.2–131
Storm surges, 8.2–132
Stratospheric winds, 8.2–198
Stream functions, 8.2–119
Sunshine calculation, 8.2–62
Swoboda, Gustave J. H., 8.2–33

Symposia, 8.2–7, 8.2–44

Taylor, Sir Geoffrey, 8.2–1
Teaching of meteorology, 8.2–26
Temperature charts, 8.2–166
Temperature deviations, 8.2–166
Temperature effects, 8.2–47, 8.2–281
Temperature effects on snow, 8.2–240
Temperature in glaciers, 8.2–172
Temperature profiles, 8.2–170
Temperature trends, 8.2–167
Tent climates, 8.2–275
Thermocouple standardization, 8.2–76
Thunderstorm electricity theory, 8.2–313
Thunderstorm forecasting, 8.2–65
Thunderstorm structure, 8.2–65
Topographic influences, 8.2–287
Trade wind variations, 8.2–184
Trans-Antarctic Expedition, 1955–56, 8.2–5
Tropospheric structure, 8.2–111
Turbulence due to aircraft, 8.2–185
Turbulence effects, 8.2–183
Turbulence in frictional layers, 8.2–121
Turbulence research, 8.2–182
Turbulent diffusion, 8.2–179
Twilight, 8B–27
Twilight auroral spectra, 8B–81
Twilight illumination, 8B–84
Twilight infrared spectrum, 8B–81
Twilight luminescence spectra, 8.2–152
Twilight phenomena, 8.2–303, 8B–34, 8B–95
Twilight radiation, 8B–23, 8B–25
Twilight sodium spectrum, 8B–107
Twilight spectra, 8.2–304, 8B–114

Ultraviolet absorption by hydrometeors, 8.2–159
Ultraviolet band of night sky, 8B–99
Ultraviolet solar radiation, 8.2–157
Ultraviolet spectrum, 8.2–154, 8.2–156
Ultraviolet variations, 8B–79
Underwater television, 8.2–37
U. S. participation in IGY, 8B–153
Upper air analysis, 8.2–93
Upper air humidity, 8.2–209
Upper air inversions, 8.2–297
Upper air statistical analysis, 8.2–110
Upper air temperature extremes, 8.2–171
Upper air temperatures, 8B–10
Upper air wind analysis, 8.2–110
Upper air wind measurement, 8.2–64
Upper atmosphere, 8B–55, 8B–64, 8B–72
Upper atmosphere bibliographies, 8B–87
Upper atmosphere density measurement, 8.2–87
Upper atmosphere research, 8B–34
Upper level ridge forecasting, 8.2–135
Upper level trough movement forecasting, 8.2–135
Upper stratosphere, 8B–42

Van Rhijn method, 8B–126, 8B–137
Vegard-Kaplan bands, 8B–4
Visibility of lights, 8.2–295
Visibility theory, 8.2–295
Volcanic dust, 8.2–302
Vorticity, 8.2–126

Warm fronts, 8.2–219
Water level data, 8.2–225
Water power, 8.2–250
Waterspout observations, 8.2–140
Waterspouts, 8.2–136, 8.2–140
Wave height distribution, 8.2–36
Wave spectra, 8.2–43
Waves at a barrier, 8.2–34
Weather sensitivity, 8.2–283
Weather types, 8.2–175
Whirlwinds, 8.2–138
Wind data, 8.2–186
Wind driven currents, 8.2–193
Wind effects, 8.2–1
Wind estimation, 8.2–177
Wind fields over land and sea, 8.2–178
Wind profile theory, 8.2–121
Wind profiles, 8.2–180
Wind utilization, 8.2–197
Wind-wave relationships, 8.2–191
Wind waves, 8.2–195
Windmills, 8.2–196
Würm glaciation, 8.2–269

X-ray spectrum, 8.2–154

Zenith twilight, 8B–53, 8B–65
Zodiacal light, 8B–40, 8B–47, 8B–83
Zodiacal light bibliographies, 8B–128
Zonal winds, 8.2–125

INDEX OF GEOGRAPHICAL LOCATIONS

Polar Regions, 8.2–282
Northern Hemisphere, 8.2–133
North America, 8.2–256
Alaska, 8.2–3
College, 8.2–148, 8B–49, 8B–59
Canada
Baffin Island, 8.2–165
Northern Canada, 8.2–173
Saskatoon, 8B–44, 8B–122
Greenland, 8.2–267
United States
California, 8.2–147
Cactus Peak, 8B–51, 8B–88, 8B–89, 8B–90, 8B–110, 8B–111, 8B–126
Mojave Desert, 8B–74
Maryland
Washington Grove, 8B–53
Massachusetts
Blue Hill, 8.2–167
New England, 8.2–167
New Mexico
Sacramento Peak, 8B–111, 8B–125, 8B–157
White Sands, 8B–139, 8B–150
Texas
McDonald Observatory, 8B–45
Washington, 8.2–266
West Indies
Jamaica, 8.2–159
Virgin Islands
Anegada, 8.2–184
South America, 8.2–256
Europe, 8.2–261
Austria, 8.2–226, 8.2–227
Vienna, 8.2–17
Zugspitze, 8.2–113
Baltic Sea, 8.2–89, 8.2–131
British Isles, 8.2–23, 8.2–71, 8.2–166, 8.2–168, 8.2–231, 8.2–249, 8.2–264
Great Britain, 8.2–74, 8.2–107, 8.2–251, 8.2–258
England, 8.2–52, 8.2–188, 8.2–206, 8.2–209, 8.2–210, 8.2–229, 8.2–236
Bidston, Liverpool, 8.2–230
Bristol, 8.2–265
Chilgrove, 8.2–225
Devon, 8.2–259
East Malling, 7.2–72
Essex, 8B–1
London, 8.2–108, 8.2–109
Mitcham, 8.2–138
Suffolk, 8.2–127
Thorney Island, 8.2–187
Tunbridge Wells, 8.2–245
Scotland, 8.2–139, 8.2–207, 8.2–243
North Uist, 8.2–257
Cairngorms, 8.2–207
English Channel, 8.2–220
Ireland
Valentia
Irish Sea, 8.2–38, 8.2–186
Central Europe, 8.2–250
France
Haute Provence Observatory, 8B–29, 8B–78, 8B–79, 8B–89, 8B–92, 8B–116
Lyon Observatory, 8B–29
Pic du Midi Observatory, 8B–3, 8B–36, 8B–121
Germany, 8.2–16, 8.2–24, 8.2–169, 8.2–228
Berlin, 8.2–277
Essen, 8.2–18
German Bight, 8.2–40
Hamburg, 8.2–142
Main River, 8.2–287
Netherlands, 8.2–136
North Sea, 8.2–131, 8.2–132
Norway, 8.2–270
Poland
Herjngsdorf, 8.2–274
Scandinavia, 8.2–268
U.S.S.R. (European & general)
Caucasas, 8B–9
Asia
Kazakh S.S.R.
Alma Ata, 8B–40
Africa, 8.2–234
Algeria
Tamanrasset, 8B–36
Belgian Congo
Biano Katanga, 8B–85
Gold Coast, 8.2–22
Accra, 8.2–217
Kalahari, 8.2–284
Nigeria, 8.2–244
Ibidan, 8.2–118
South Africa, 8.2–79
Panfontein, 8B–85
Pretoria, 8.2–8
Table Mountain, 8.2–237
Sudan, 8.2–235
White Nile, 8.2–247
Australasia
Australia
Victoria, 8.2–48
Tasmania
Mt. Wellington, 8.2–102
New Zealand
Oro River, 8.2–252
Antarctica
Mac Rovertson Land, 8.2–6, 8.2–9, 8.2–12, 8.2–122, 8.2–123, 8.2–324
Oceans, Seas and Islands
Antarctic, 8.2–278
Arctic, 8.2–4, 8.2–50
Norwegian Sea, 8.2–189
Atlantic
North Atlantic, 8.2–73, 8.2–90, 8.2–193, 8.2–208
South Atlantic
Couvet Island, 8.2–11
Pacific
Western Pacific, 8.2–42
Red Sea
Aqaba Gulf, 8.2–190